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Marine Algae from the Suva Lagoon and Reef, Fiji

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Abstract

A total of 222 taxa (excluding Cyanophyceae and non-geniculate corallinales) are reported from the Suva Lagoon and Reef (Fiji), consisting of 71 Chlorophyceae, 24 Phaeophyceae and 127 Rhodophyceae. Of these, five represent new or undescribed species. The Suva flora is comparatively impoverished with only 222 species, although the relative percentage of the three classes is comparable to the overall Fijian flora, in particular with respect to the Rhodophyceae.

Introduction

History of Fijian Phycological Studies

Geographical Context

The Fiji Islands (located between 177°E, 178°W and 16–20°S) comprise 332 islands, with a land area of 18276 km^2 scattered over 260000 km^2 of tropical ocean. The four main islands of the group are Viti Levu, Vanua Levu, Taveuni and Kadavu, with three smaller island groups, the Yasawas, the Lomaiviti Group and the Lau Group. The isolated island of Rotuma is found about 465 km north of Viti Levu.

Taxonomy and Floristics

The first reports of Fijian algae were by Grunow (1874), Dickie (1876) and Askenasy (1888). The history of phycological collecting in the Fiji Islands is described in detail in N'Yeurt *et al.* (1996*b*, pp. 50, 51).

Herbarium Collections of Fijian Algae

The collections on which this study was based are widely scattered in herbaria in the Northern Hemisphere (e.g. SAP, BM, US), Fiji (SUVA) or in New Zealand (AKU; Chapman). Some Fijian collections are housed in Dr I. A. Abbott's personal herbarium (UH) and were reviewed in preparation of this work. Collections housed in the Bernice P. Bishop Museum Herbarium (BISH, collectors: Smith 1934, 1947; Greenwood 1941; Doty 1952; Newhouse 1952; Kondo 1968; Abbott *et al.* 1973; Booth 1975, 1977; Nicholson 1978) have also been examined by the author. H. Kasahara deposited a duplicate set of his Fijian collections at the then Institute of Marine Resources (now Marine Studies Programme), University of the South Pacific and these are now housed in the South Pacific Regional Herbarium (SUVA). These included many unidentified specimens of brown, green and red algae. Unfortunately, none of the collections made by Dr Hiroshi Itono, Dr Tetsuru Ajisaka and Dr Sachito Enomoto in 1982 were deposited in SUVA and the present whereabouts of this material is suspected to be scattered in Japanese herbaria, mainly at Kagoshima University and Kobe University in Japan (H. Kasahara, pers. comm.). Some of the collections made by Carlson in 1972 and 1973 and reported in Chapman (1977), are also

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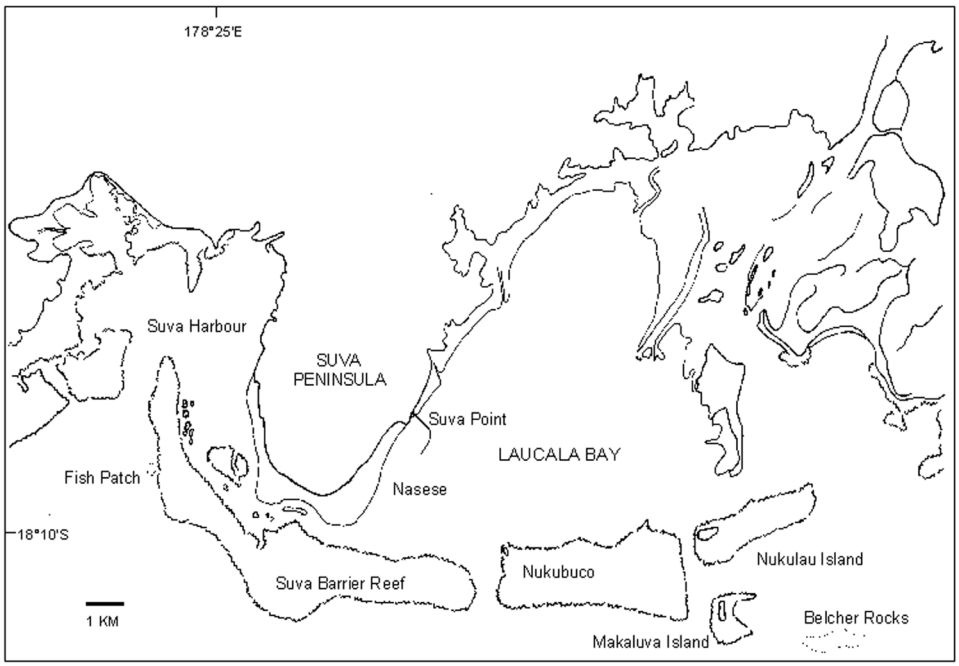


Fig. 1. The map showing Suva Lagoon and Reef.

housed in the South Pacific Regional Herbarium. Recently, D. J. Garbary deposited a duplicate set of the Fijian algae reported in his 1991 paper (Garbary *et al.*) in SUVA.
All new collections resulting from the present study are deposited as voucher specimens in the Phycological Herbarium, South Pacific Regional Herbarium (SUVA), either as microscope slides, pressed specimens or liquid-preserved material.

The Suva Lagoon and Reef

The Suva Lagoon and Reef (Fig. 1) is a major marine ecosystem bordering one of the largest urban centres in the South Pacific, in a situation where the influence of urbanisation and industrialisation are considerable (Naidu *et al.* 1991). Viti Levu is the largest island in the Fiji Group and the population of the urban Suva area has increased considerably over the past 30 years, being close to 100000 in 1997.

Much of the Suva area lies on uplifted calcareous marl, probably of lagoonal origin (G. Yeo, unpubl. data). The Suva Lagoon and Reef (Fig. 1) can be classified as a low-latitude body of tropical oceanic waters and Pleistocene-age coral reefs, with winter sea surface temperatures of 20 to 25°C and an annual temperature variation of less than 5°C (Elliott 1960, in Meadows and Campbell 1978). Situated in the south-eastern part of Viti Levu, it is confined by the Bay of Islands to the north-west and by the Rewa river delta in the north-east.

The Suva Barrier Reef borders the Suva Lagoon and Laucala Bay to the south and its steep fore-reef slopes down to 2000 m in the Suva Basin. At high tides the reef area is submerged and a shallow layer of seawater enters the bay twice a day about high water (Naidu *et al.* 1991). At Suva Harbour, the reef is 10 km long and ranges from 0.5 to 2 km in width. The total reef area is about 1750 ha, while the total area of the Suva Lagoon at high tide is approximately 80×10^6 m^2 (Solomon and Kruger 1996).

The inner lagoon area ranges from 250 m to 3 km in width and is subject to much seasonal siliciclastic fluvial sedimentory input by the Rewa river*, which reduces salinity and increases turbidity, as well as contributes to degraded water quality having strong impact on all biotopes. For instance, total nitrogen content ranges from 0.04 to 6.8 mg L^{-1}, while nitrate levels range from 10 to 5000 µg L^{-1}. Phosphorus content ranges from 6 to 305 µg L^{-1}, indicating quite polluted conditions. Clarity ranges from 0.5 to 5 m (Naidu *et al*. 1991). In the middle of Laucala Bay, the depression of the Foul Ground separates the siliciclastic regime of the lagoon from the barrier reef-controlled areas to the south (Schneider *et al*. 1995). Sediments in the bay area are hence generally very fine, while coarser-grained sediments of higher carbonate content are found close to the barrier reef, as a result of the washing away of finer particles and accumulation of biologically derived carbonate particles by waves and currents in the passes (Kyaw 1982). Extensive tidal flats of fine silt and clay derived from the Rewa River occur in the north-eastern and eastern end of Laucala Bay and these are mostly fringed by coastal mangroves and seagrass beds. Bay muds are about 25–40 m thick at Suva Harbour (Shorten 1993, in Solomon and Kruger 1996). At high water, Laucala Bay has a surface area of 52 × 106 m^2 and 39 × 106 m^2 at low water (Campbell *et al*. 1982; Solomon and Kruger 1996).

The little islands of Nukubuco (Sandbank) and Nukulau form emerged caps on the barrier reef dipping gently into the lagoon, while Makaluva Island is closely exposed to the reef front. These three unconsolidated sand and gravel structures are typical sand cays developing on the leeward side of the Suva Barrier Reef platform and are more or less stabilised by vegetation (G. Yeo, unpubl. data).

The main localities within the Suva Lagoon and Reef area that are mentioned in this study are represented in Fig. 1.

Materials and Methods

Collecting and Laboratory Methods

Collecting sites for species listed here are shown in Fig. 1. Specimens were obtained with the aid of SCUBA, snorkelling or by reef walking and were preserved in 3–5% buffered formaldehyde. Dried herbarium samples were rehydrated in weak detergent solution for about 1 h prior to sectioning, while formalin-preserved material was rinsed briefly in distilled water. Calcified algae were decalcified with 10–25% hydrochloric acid or 10% nitric acid. Specimens were sectioned at 10–30 µm thickness with a Reichert CO_2 freezing microtome. A camera lucida was used to make pencil drawings of the specimens. Microscope slides are housed in the South Pacific Regional Herbarium in a numbered series prefixed by 'S' (slide) and are referred to in the results.

Macrophotography was with a Nikon F2A with Kodak Plus-X pan film, developed in the laboratory. Photomicrographs were taken with a Zeiss Photoscope III or Olympus BH2 photomicroscope. Some specimens were photographed with an Olympus SZ-40 stereomicroscope fitted with an Olympus PM-10 ADS camera unit and Olympus PM-CBSP exposure unit.

Nomenclature

Wherever appropriate, the nomenclature adopted (including information on basionym and nomenclatural synonymy) follows that of Silva *et al*. (1987, 1996), or the latest available information on a particular species. Except where type and authentic material has been personally examined by the author, complete synonymy is not listed but an indication is given to previously published information where available. Where available, illustrated regional bibliographic references citing voucher specimens are given after binomials for biogeographic purposes.

* The Rewa River has an average annual freshwater discharge of 160 $m^3 s^{-1}$ and peak discharge of 14900 $m^3 s^{-1}$, mainly from the Vunidawa river distributary (Naidu *et al*. 1991).

Herbaria and Type Specimen Survey

A comprehensive review of all algal specimens pertaining to the Suva Lagoon and Reef area housed in the South Pacific Regional Herbarium (SUVA) was carried out, including unidentified collections made in Fiji by H. Kasahara in 1985. Fijian collections by Dr Bruce Carlson and Dr V. J. Chapman housed at the Auckland Institute and Museum (AKU) and Fijian and Hawaiian material housed at the Bernice P. Bishop Herbarium in Honolulu, Hawai'i (BISH) was examined. Tropical algal collections by K. Okamura, S. Segawa and Y. Yamada were examined in the herbarium of the Faculty of Science, Hokkaido University (SAP) for comparison purposes. The personal herbaria of Drs M. Yoshizaki and H. Yamamoto were examined for comparison of Fijian Nemaliales and Gracilariales. For some critical species, the relevant type material was examined either in person or via inter-herbarium loan. Herbarium abbreviations follow that of Holmgren *et al.* 1981.

Systematics

Division **Cyanophyta** Schussnig
Order **Nostocales**
Family **Nostocaceae** Kützing 1843: 203
Genus ***Hormothamnion*** Grunow 1867: 31

Hormothamnion enteromorphoides Grunow 1867: 31, pl. I, fig. 25 (type locality: Guadeloupe, West Indies); Dawson 1954: 379, fig. 3*n*.

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 56.

Representative Material Examined

Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) S10: 17).

Plants turf-like, bright blue green and composed of simple erect filaments 9–11 µm in diameter, with hyaline sheaths. Trichomes 8–9 µm in diameter, constricted at the cross-walls. Cells subspherical, 4.5–7.5 µm in diameter. Heterocysts quadrate to rectangular, 9–11 µm in diameter and 10–16 µm long.

Habitat and Remarks

Epiphytic on other algae in the lagoon.

Family ***Oscillatoriaceae*** Kirchner in Engler and Prantl 1898: 61
Genus ***Lyngbya*** C.Agardh 1824: 25, *nomen conservandum*

Lyngbya majuscula (Dillwyn) Harvey 1833: 370; Dawson 1954: 380, fig. 3*d*

Basionym and Nomenclatural Synonymy

Conferva majuscula Dillwyn 1809 (1802–1809): 40, suppl. pl. *A* (lectotype locality: England).

Fiji and Rotuma Records

Askenasy 1888; Chapman 1971: 164; Garbary *et al*. 1991: 251; South 1991: 3; South and Kasahara 1992: 46; N'Yeurt 1993: 67, figs 20, 34, 36.

Representative Material Examined

Suva Harbour (*Keats*, 23.viii.1994: SUVA (USP) 785).

Filaments blue-green, yellowish- or blackish-green, up to 30 mm × 20–43 µm; caespitose and elongate, forming loose tufts on coral or other substratum. Sheath hyaline,

up to 11 μm in diameter. Apices not attenuate, apical cell without calyptra. Cells 2–4 μm long, with unconstricted cross-walls.

Habitat and Remarks

Forming entangled clumps in coral interstices or on other algae, subtidally or intertidally.

Family ***Stigonemataceae*** Kirchner in Engler and Prantl 1898: 80
Genus ***Kyrtuthrix*** Ercegovic 1929: 170

Kyrtuthrix maculans (Gomont) Umezaki 1958; 1961: 85, pl. 14, fig. 1 (Fig. 12*a*, *b*)

Basionym and Nomenclatural Synonymy

Brachytrichia maculans Gomont 1901: 210, pl. 5, figs 5–7 (type locality: Siam).

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 57.

Representative Material Examined

Laucala Bay (*South*, 21.iv.1992: SUVA (USP) 593, S8: 2).

Thallus a blackish, expanded crust, with filaments 16–17 × 155–160 μm. Trichomes 4–7 μm in diameter, constricted at cross walls and terminally attenuated into hairs; branching V-shaped. Cells barrel-shaped, quadrate or cylindrical, 6–12 × 4–7 mm; heterocysts quadrate and intercalary, 7–8 × 6–8 mm. Hormogones and spores not seen.

Habitat and Remarks

Growing as a blackish crust on rocks in the lower intertidal.

Division **Chlorophyta** Pascher
Order **Ulvales** Blackman et Tansley
Family **Ulvaceae** Lamouroux
Genus ***Enteromorpha*** Link in Nees 1820: 5, *nomen conservandum*

Key to the Suva Lagoon and Reef Species and Subspecies of Enteromorpha

1. Thallus terete 3
   Thallus flattened to compressed 2
2. Thallus flattened, ligulate; not tubular . . . . . *E. hendayensis*
   Thallus tubular, not flattened or ligulate 5
3. Thallus with radially disposed lateral branches at a narrow angle . . . . . *E. clathrata*
   Thallus with irregularly disposed lateral branches, angle of branching not narrow 4
4. Thallus sparsely branched, cells more than 20 μm in diameter . . . . . *E. flexuosa*
   Thallus profusely branched, cells less than 18 μm in diameter . . . . . *E. flexuosa* subsp. *paradoxa*
5. Filaments coarse and torulose; apices distinctly broadened; cell not compressed . . . . . *E. intestinalis*
   Filaments fine, not torulose; apices not distinctly broadened; cells compressed . . . . . *E. compressa*

Enteromorpha clathrata (Roth) Greville 1830: lxvi, 181; Dawson 1954: 384, fig. 6*d*, *e*; Egerod 1974: 134, fig. 4 (Figs 2, 3*a*–*b*)

Basionym and Nomenclatural Synonymy

Conferva clathrata Roth 1806: 175–178 (type locality: Baltic Sea, Germany).

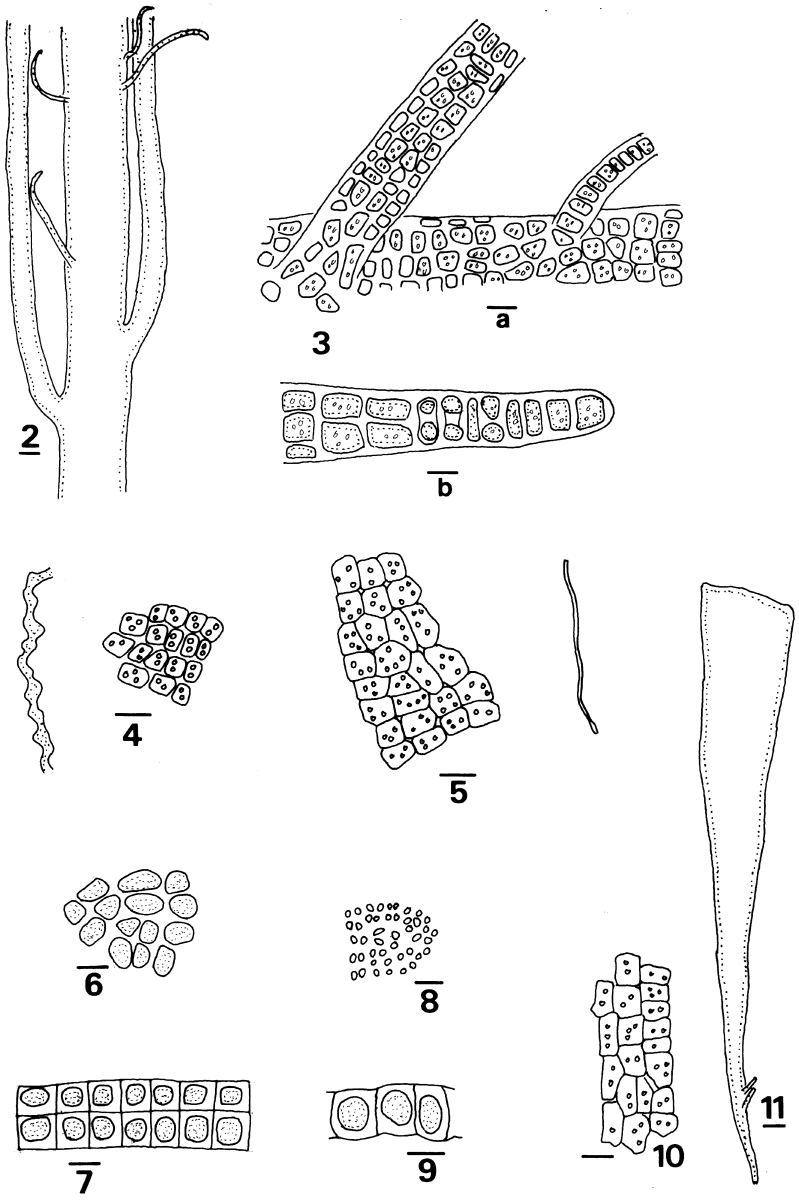


Fig. 2. *Enteromorpha clathrata*. General habit (SUVA (USP) 1165). Scale bar = 100 µm. **Fig. 3.** (*a*) *Enteromorpha clathrata*. Detail of surface of thallus. Scale bar = 20 µm. (*b*) Upper portion of lateral branchlet, showing apical cell. Scale bar = 10 µm. **Fig. 4.** *Enteromorpha intestinalis*. Thallus surface with torulose habit (×1) on the left (SUVA (USP) 125). Scale bar = 20 µm. **Fig. 5.** *Enteromorpha flexuosa*. Thallus surface with simple habit (×1) on the right (SUVA (USP) 682). Scale bar = 20 µm. **Fig. 6.** *Ulva lactuca*. Thallus surface (SUVA (USP) 689). Scale bar = 20 µm. **Fig. 7.** *Ulva lactuca*. Cross-section of thallus (SUVA (USP) 689). Scale bar = 20 µm. **Fig. 8.** *Gayralia oxysperma*. Thallus surface (SUVA (USP) 189). Scale bar = 20 µm. **Fig. 9.** *Gayralia oxysperma*. Cross-section of monostromatic thallus (SUVA (USP) 189). Scale bar = 10 µm. **Fig. 10.** *Enteromorpha hendayensis*. Thallus surface (SUVA (USP) S13: 4). Scale bar = 20 µm. **Fig. 11.** *Enteromorpha hendayensis*. General habit (SUVA (USP) S13: 4). Scale bar = 200 µm.

Fiji and Rotuma Records

Kapraun and Bowden 1978: 200; N'Yeurt *et al*. 1996*b*: 58.

Representative Material Examined

Suva Point (*Ehny,* 10.ix.1997: SUVA (USP) 1165).

Thallus irregularly branched and proliferous, forming entangled masses. Filaments of main axis 280–300 µm in diameter, lateral branchlets 40–100 µm in diameter, issued distichously to radially at a narrow angle. Ultimate branchlets and distal portions of axes uniseriate, 13–18 µm in diameter. Cells angular and mostly regularly arranged in surface view, 11–17 µm in diameter. One to four pyrenoids per cell (usually 2 or 3).

Habitat and Remarks

Common in tide pools on the intertidal marl at Suva Point.

Enteromorpha compressa (Linnaeus) Nees 1820: index (2); Dawson 1956: 27, fig. 1; Bliding 1963: 132, figs 82*a–f,* 83*a–d,* 84*a–f*

Basionym and Nomenclatural Synonymy

Ulva compressa Linnaeus 1753: 1163 (type locality: Europe).

Fiji and Rotuma Records

Kasahara 1988; N'Yeurt *et al*. 1996*b*: 58.

Representative Material Examined

Makaluva I. (*Kasahara*, 11.xi.1985: SUVA (USP) 123; 17.x.1985: SUVA (USP) 122).

Thallus simple to repeatedly branched, 16–25 mm high, composed of compressed, upwardly broadened axes 2–5 mm in diameter. Cells polygonally rounded, about 14 × 23 µm, densely arranged and appearing compressed in surface view.

Habitat and Remarks

On pebbles and rocks on the reef flat.

Enteromorpha flexuosa (Wulfen) J.Agardh 1883: 126 (incl. subsp. ***flexuosa***; Bliding 1963: 73, figs 38–40 (Fig. 5)

Basionym And Nomenclatural Synonymy

Conferva flexuosa Roth 1800: 188 (type locality: Duino, near Trieste, Adriatic Sea).
Ulva flexuosa Wulfen 1803: 1 (*nomen novum*).

Fiji And Rotuma Records

Kapraun and Bowden 1978: 200 (including *E. lingulata*); South and Kasahara 1992: 47; N'Yeurt 1996: 365, fig. 16; N'Yeurt *et al*. 1996*b*: 58; Tabudravu 1996.

Representative Material Examined

Suva Point (*South*, 7.vii.1990: SUVA (USP) 120); Nukulau I. (*South*, 19.xii.1990: SUVA (USP) 603); Suva Barrier Reef (*South*, 22.i.1992: SUVA (USP) 682).

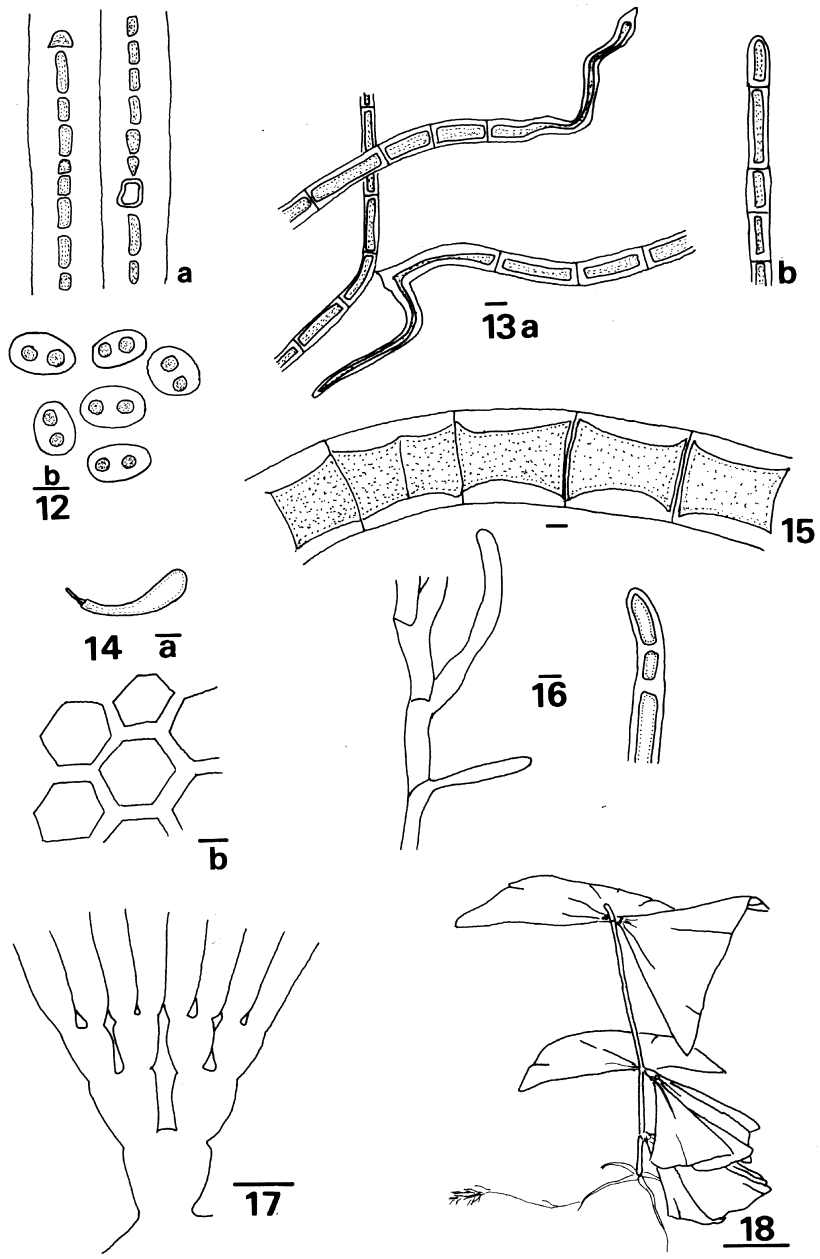


Fig. 12. (*a*) *Kyrtuthrix maculans*. Habit showing intercalary heterocyst. Scale bar = 10 µm. (*b*) Surface of thallus, showing filament ends. Scale bar = 10 µm. **Fig. 13.** (*a*) *Rhizoclonium samoense*. General habit, showing elongate basal cell (SUVA (USP) 34). Scale bar = 100 µm. (*b*) Thallus apex. Scale bar = 100 µm. **Fig. 14.** (*a*) *Bornetella nitida*. Habit, showing characteristic gourd-like shape (SUVA (USP) 015). Scale bar = 7 mm. (*b*) Surface of thallus. Scale bar = 100 µm. **Fig. 15.** *Chaetomorpha crassa*. Filament with barrel-shaped cells (SUVA (USP) 1166). Scale bar = 100 µm. **Fig. 16.** *Cladophoropsis sundanensis*. Habit (SUVA (USP) 457). Scale bar = 100 µm. **Fig. 17.** *Tydemania expeditionis*. Flabelli stage. Detail of blade articuli (SUVA (USP) 868). Scale bar = 200 µm. **Fig. 18.** *Tydemania expeditionis*. Habit of flabelli stage (SUVA (USP) 868). Scale bar = 5 mm.

Plants light green and fleecy, sparsely branched 150–155 µm in diameter, up to 20 cm long. Cells angular, subrectangular up to 25 × 35 µm, arranged in distinct longitudinal rows. Three to six (usually 3) pyrenoids per cell. Lateral branches often monofilamentous, 25–30 µm in diameter.

Enteromorpha flexuosa (Wulfen) J.Agardh subspecies ***paradoxa*** (C.Agardh) Bliding 1963: 79, figs 42*a–g*, 45*a–f*; Egerod 1974: 132, figs 1–3 (Fig. 46)

Basionym And Nomenclatural Synonymy

Conferva paradoxa Dillwyn 1809 (1802–1809): 70, suppl. pl. *F* (syntype localities: Bangor, Wales; Brighton, England).
Ulva paradoxa C.Agardh 1817: xxii (*nomen novum*; see Silva *et al*. 1987: 92).

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 58.

Representative Material Examined

Fulaga (*Smith*, 22–26.ii.1934: BISH 546410, as *E. plumosa* Kützing); Suva Point (*South*, 18.xi.1990: SUVA (USP) 632, S9: 7).

Plants flaccid, profusely branched to the first order only, with cells arranged in distinct longitudinal and lateral rows. Main axis 45–50 µm in diameter; branches radially arranged, tapered; terminal branches 13–18 µm in diameter. Cells in main axis 13–18 × 13 µm. Only one pyrenoid only per cell.

Habitat and Remarks

Epiphytic on the seagrass *Halodule uninervis* (Forsskål) Ascherson in tidal mudflats.

Enteromorpha hendayensis Dangeard et Parriaud 1960: 1, figs 1, 2 (type locality: France); Dangeard 1962: 14, figs 3, 4, pl. *II*; Bliding 1963: 95, fig. 57*a–f* (Figs 10, 11)

Fiji and Rotuma Records

N'Yeurt 1997: 39.

Representative Material Examined

Suva Point (*N'Yeurt*, 3.ix.1995: SUVA (USP) S13: 4).

Thallus dark green, erect and caespitose, composed of simple, flattened and basally tapered, distally truncated blades 5.5–6 mm × 240–880 µm. Surface cells subrectangular to cuboidal, 18–28 × 8.5–20 µm, with (2) 3 pyrenoids per cell.

Habitat and Remarks

Forming dense tufts on rocks, close to the low-water mark. The caespitose and basally tapered, dark green flattened blades make this a distinct species in the field.

Enteromorpha intestinalis (Linnaeus) Nees 1820: index (2); Dawson 1954: 383, fig. 6*c*; Egerod 1974: 134, fig. 5 (Fig. 4)

Basionym and Nomenclatural Synonymy

Ulva intestinalis Linnaeus 1753: 1163 (type locality: 'in Mari omni').

Fiji and Rotuma Records

Chapman 1971: 164; N'Yeurt *et al*. 1996*b*: 58.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 125).

Thallus coarse and tubular, contorted; up to 50 × 5 mm. Filaments simple above, irregularly radially branched near narrow holdfast. Cells angular to subrectangular, 7–20 × 7–13 µm; irregularly disposed. Usually 2, rarely 3, pyrenoids per cell.

Habitat and Remarks

Commonly found attached to rocks and shells on the reef flat, close to the shore.

Genus ***Gayralia*** Vinogradova 1969: 1354
Gayralia oxysperma (Kützing) Vinogradova ex Scagel *et al*. 1989: 72 (Figs 8, 9)

Basionym and Nomenclatural Synonymy

Ulva oxysperma Kützing 1843: 296 (type locality: Baltic Sea, Germany).

Fiji and Rotuma Records

Kapraun and Bowden 1978: 200 (as *Ulvaria oxysperma*); N'Yeurt *et al*. 1996*b*: 59 (as *Monostroma oxyspermum*).

Representative Material Examined

Suva Barrier Reef (*Lam*, 8.viii.1991: SUVA (USP) 189).

Thallus light green, 3–4 cm across, membranous and delicate, attached to the substratum by basal rhizoids. Blades irregularly foliose, monostromatic. Cells 9–11 × 11–12 µm, irregularly polygonal to rounded, randomly arranged or sometimes grouped or in rows. Reproduction exclusively by biflagellate zoospores formed in marginal cells of thallus (Bliding 1969, p. 587).

Habitat and Remarks

Growing on the reef flat, attached to coralline or rocky substratum.

Genus ***Ulva*** Linnaeus 1753: 1163, *nomen conservandum*
Ulva lactuca Linnaeus 1753: 1163 (type locality: 'in Oceano'); Bliding 1969: 540, figs 1, 2, 3*A–C*, 4*A–F*, 5*A–J*; Womersley 1984: 141, figs 44*A*, 45*A–C* (Figs 6, 7)

Fiji and Rotuma Records

Chapman 1971: 164; Kasahara 1985: 13, pl. 1 fig. 2; N'Yeurt *et al*. 1996*b*: 58.

Representative Material Examined

Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) 689).

Thallus up to 10 cm broad, flat and simple, membranous and irregularly lacerate with small holes, attached by a small rhizoidal holdfast. Blade distromatic; cells 20–23 × 20–21 µm, subrectangular and adherent, with a single outer chloroplast.

Habitat and Remarks

Ulva lactuca being recorded from cold to arctic waters in Europe, tropical records of this species need revising.

Order **Cladophorales** Haeckel
Family **Anadyomenaceae** Hauck 1884: 420
Genus ***Microdictyon*** Decaisne 1841: 115

Microdictyon japonicum Setchell 1925: 107 (type locality: Tateyama, Chiba Prefecture, Japan); 1929: 528, figs 49–56 (Fig. 27)

Fiji and Rotuma Records

Askenasy (1888); Chapman (1971); Kasahara (1985: 37, pl. 6, fig. 2*a*, *b*); 1988; N'Yeurt *et al*. 1996*b*: 59.

Representative Material Examined

Fish Patch (*Keats*, 5.viii.994: SUVA (USP) 769, S11: 5).

Thallus light yellow-green, consisting of a monostromatic, delicate reticulate blade up to 5 × 7 cm, of mesh diameter 60–520 µm, with prominent veins. Cells of main filaments 72–130 µm in diameter, terminal cells 42–50 µm in diameter. Branching irregularly stellate from main filaments, becoming predominantly irregular in outer periphery of thallus. Branch anastomoses frequent, taking place by means of annulate, smooth attachments from unmodified branch segments.

Habitat and Remarks

Grows intertidally and up to a depth of 42 m. The delicate mesh and annulate anastomoses of the Fijian plants agree well with the description of the Type of this species by Setchell (1929).

Genus ***Struvea*** Sonder 1845: 49, *nomen conservandum*
Struvea elegans Børgesen 1912: 264, figs 13, 14*a–g* (syntype localities: various in Virgin Is) (Figs 19–22, 29)

Fiji and Rotuma Records

N'Yeurt 1997: 45.

Representative Material Examined

Fish Patch, Suva (*Keats*, 21.xi. 1994: SUVA (USP) 1139, S14: 1, S14: 3).

Thallus 35–70 mm high, composed of 7 or 8 clustered, slightly basally annulate and once- or twice-branched monosiphonous stalks about 15–45 × 1 mm, bearing a terminal blade 5–25 × 15–20 mm, composed of 12–15 pairs of opposite cross-walled branched filaments 200–250 µm in diameter, organised in a network of first- and higher-order distichously arranged laterals. Cell division involving segregative cleavage of cytoplasm of parent axes producing uniseriate series of equally sized daughter cells. In young blades, cell division is synchronous and intercalary cross-wall formation is not seen, resulting in equal septation of second-order laterals; in older blades non-synchronous division sometimes occurs but no intercalary cell septation is seen. Tenacular cells with crenulate pads

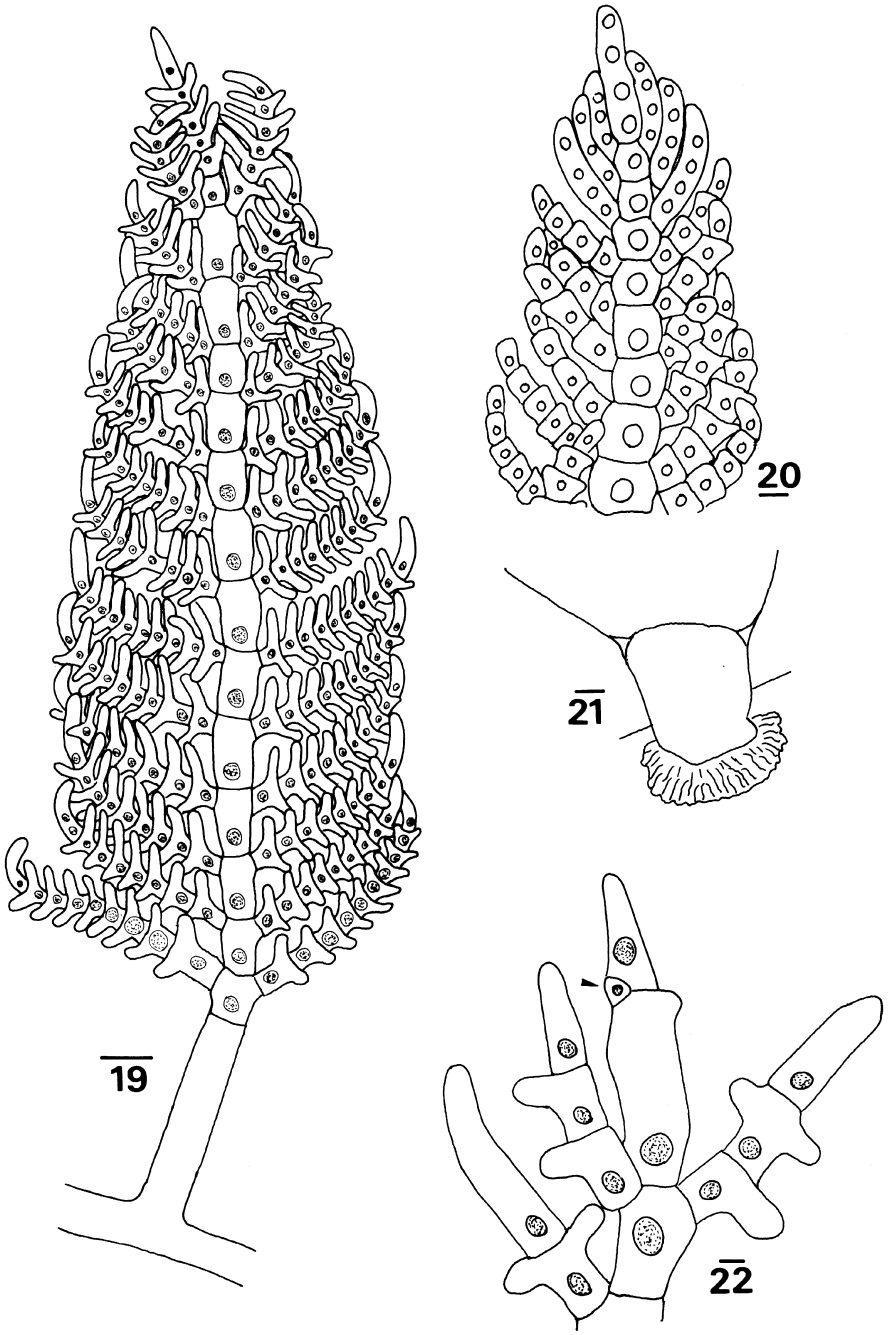


Fig. 19. *Struvea elegans*. Habit of blade. (SUVA (USP) S14: 1). Scale bar = 800 µm. **Fig. 20.** *Struvea elegans*. Apex of young blade, showing synchronous cell division (SUVA (USP) S14: 3). Scale bar = 20 µm. **Fig. 21.** *Struvea elegans*. Detail of attachment haptera with crenulate pad (SUVA (USP) S14: 3). Scale bar = 20 µm. **Fig. 22.** *Struvea elegans*. Detail of mature blade, showing lateral branchlet initial (arrowhead) (SUVA (USP) S14: 1). Scale bar = 100 µm.

terminate most distal third-order laterals and fuse with adjacent laterals to produce a monoplanar network. Young blades have a regular, terminally attenuated plumose outline, with apical cells of primary laterals curving in on the margins and forming regular tenacular attachments. Older blades have a more irregular, ragged outline.

Habitat and Remarks

Growing only in deep water habitats, at a depth of 42 m on the reef wall, together with *Boodlea* and *Microdictyon* spp. Coppejans *et al*. (1995, p. 96, fig. 38) described a deep-water '*Struvea anastomosans*' from Papua New Guinea which from the figures would appear similar to the Fijian plants. It would be desirable to ascertain if this material exhibits segregative or intercalary cell division. Considering that the Fijian plants exhibit synchronous and segregative cell division, they are placed in *Struvea*. They are in good agreement with *S. elegans* as described by Børgesen (1912) from deep-water habitats in the West Indies and habit photographs by Littler and Littler (2000) from the Caribbean. *Struvea elegans* primarily differs from the type species *S. plumosa* Sonder by virtue of its proximally branched stalks, smaller size and almost perpendicularly orientated first- and second-order laterals (Kraft and Wynne 1996, p. 139).

Family **Cladophoraceae** Haeckel
Genus ***Rhizoclonium*** Kützing 1843: 261
Rhizoclonium samoense Setchell 1924: 177, fig. 42 (type locality: Tutuila I., American Samoa) (Fig. 13*a*, *b*)

Fiji and Rotuma Records

N'Yeurt 1997: 47.

Representative Material Examined

Suva Barrier Reef (*Lam*, 8.viii.1991: SUVA (USP) 34).

Thallus consisting of tufts of erect unbranched filaments 80–100 µm in diameter, attached via a basal rhizoid-like elongated cell. Lateral rhizoids sometimes connecting adjacent filaments. Cells rectangular, 2 or 3 times as long as broad, with cell walls 18–25 µm thick. Filaments are unconstricted and of uniform size throughout, with rounded apices.

Habitat and Remarks

Growing on the reef flat. The plants are in good accord with Setchell's description of the type species.

Genus ***Chaetomorpha*** Kützing 1845: 203
Chaetomorpha crassa (C.Agardh) Kützing 1845: 204 (Fig. 15)

Basionym and Nomenclatural Synonymy

Conferva crassa C.Agardh 1824: 99 (syntype localities: Trieste and Venezia, Italy; England).

Fiji and Rotuma Records

Chapman 1971: 165; Kasahara 1985: 14; N'Yeurt *et al*. 1996*b*: 59.

Representative Material Examined

Nasese (*South*, 8.iv.1993: SUVA (USP) 569); Suva Point (*N'Yeurt*, 11.ix.1997: SUVA (USP) 1166).

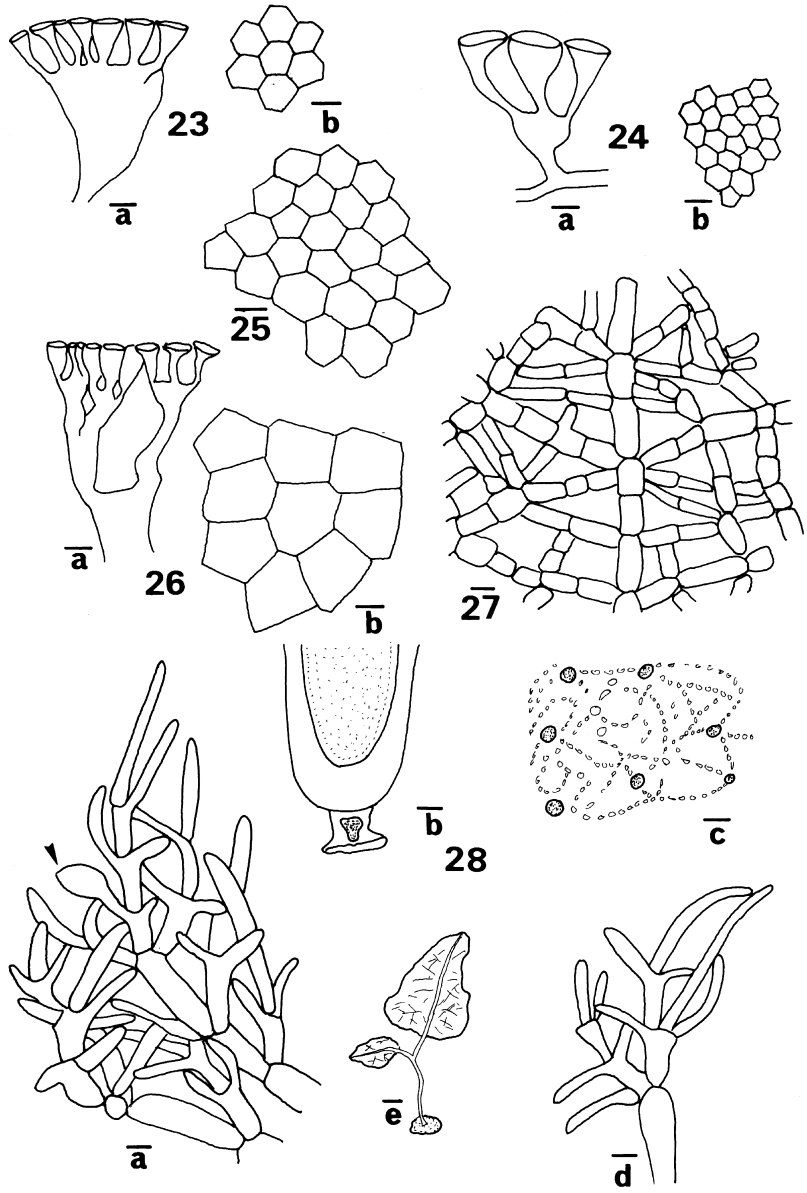


Fig. 23. (*a*) *Halimeda discoidea*. Peripheral and supporting utricles (SUVA (USP) 1168). Scale bar = 20 µm. (*b*) Surface view of decalcified thallus. Scale bar = 20 µm. **Fig. 24.** (*a*) *Halimeda gigas*. Peripheral and supporting utricles (SUVA (USP) 1169). Scale bar = 20 µm. (*b*) Surface view of decalcified thallus. Scale bar = 100 µm. **Fig. 25.** *Halimeda minima*. Surface view of decalcified thallus (SUVA (USP) 176). Scale bar = 100 µm. **Fig. 26.** (*a*) *Halimeda incrassata*. Peripheral and supporting utricles. Scale bar = 30 µm. (*b*) Surface view of decalcified thallus. Scale bar = 20 µm. **Fig. 27.** *Microdictyon japonicum*. Detail of blade network (SUVA (USP) S11: 5). Scale bar = 100 µm. **Fig. 28.** (*a*) *Boodlea vanbosseae*. Detail of anastomosing axes, showing urceolate gametangium (arrowhead) (SUVA (USP) S14: 2). Scale bar = 200 µm. (*b*) Terminal end of attachment haptera. Scale bar = 20 µm. (*c*) Detail of thallus cell, showing reticulate chloroplasts and pyrenoids. Scale bar = 5 µm. (*d*) Detail of thallus apex. Scale bar = 200 µm. (*e*) General habit. Scale bar = 1.5 mm.

Thallus dark green and crispy, consisting of rigid entangled masses of unbranched loose filaments 380–400 µm in diameter. Cells characteristically barrel-shaped, 1.1–1.3 times as long as broad; cell walls 63–72 µm thick.

Habitat and Remarks

Growing as loose, crisp and rigid entangled masses in tide pools.

Genus ***Cladophora*** Kützing 1843: 262, *nomen conservandum*
Cladophora coelothrix Kützing 1843: 272, figs 57–58 (type locality: Livorno); Hoek 1963: 40, pl. 5, figs 55–67; pl. 6, figs 68–71; pl. 7, figs 72–77; pl. 8, fig. 78; 1982: 47, figs 11–29); Womersley 1984: 190, figs 60*C*, 61*C*, *D* (Fig. 47*a–b*)

Taxonomic Synonymy

See van den Hoek (1963: 40) for nomenclature and synonymy.

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 59.

Representative Material Examined

Suva Point, Suva (*South*, 18.xi.1990: SUVA (USP) 631; 20.iv.1993: SUVA (USP) 636, S8: 12).

Thallus dark green, forming compact moss-like mats. Apical cells conspicuous, 106–130 µm in diameter. Branching irregular; ultimate branches 100–130 µm in diameter. Main axis 160–215 µm in diameter, with each branch being laterally inserted with a vertical to steeply inclined wall cutting it off from the parent cell.

Habitat and Remarks

Found as an epiphyte of seagrasses and on rocks and debris in the lower littoral.

Family **Siphonocladaceae** Schmitz 1879: 20
Genus ***Boodlea*** G.Murray et De Toni 1889: 243

Key to the Suva Lagoon and Reef Species of *Boodlea*

1. Thallus spongiose, not stalked; adventitious rhizoids absent . . . . . *B. composita*
   Thallus not spongiose, stalked with adventitious rhizoids . . . . . *B. vanbosseae*

Boodlea composita (Harvey) Brand 1904: 187, pl. 6, figs 28–35; Egerod 1952: 362, pl. 32*a*, fig. 6*a*; Dawson 1954: 390, fig. 9*c*, *d*

Basionym And Nomenclatural Synonymy

Conferva composita Harvey 1834: 157 (type locality: Mauritius).

Fiji and Rotuma Records

Chapman 1971: 165; Kasahara 1985: 33, pl. 5, fig. 2; South and Kasahara 1992: 48; N'Yeurt *et al*. 1996*b*: 60.

Representative Material Examined

Nukulau I. (*South*, 19.xii.1990: SUVA (USP) 432; *Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 10); Suva Barrier Reef (*Carlson*, 14.i.1973: SUVA (USP) 11).

Thallus bright green, reticulate and spongy, consisting of crisp hemispherical tufts 25–100 mm across. Main filaments about 318–372 µm in diameter; branching irregularly lateral, the terminal branchlets 125–227 µm in diameter. One-celled haptera interconnecting branchlets in all planes; branches and cells of fairly uniform size. Reproduction not seen.

Habitat and Remarks

Common intertidally, lodged between coral and in crevices with other algae. The bright green, crispy and spongy nature of this alga is characteristic in the field. The delimitation and status of this highly variable species is in need of taxonomic revision, as does the genus as a whole.

Boodlea vanbosseae Reinbold 1905: 148 ('van bossei') (syntype localities: various in Indonesia); Reinbold in Weber-van Bosse 1913: 70, 71, fig. 12; Dawson 1956: 29, fig. 6; Egerod 1975: 52, 53, figs 16–18 (Fig. 28*a–e*)

Fiji and Rotuma Records

N'Yeurt 1997: 52.

Representative Material Examined

Fish Patch, Suva Reef (*Keats*, 21.xi. 1994: SUVA (USP) S14: 2, *gametangial*).

Thallus 20–25 mm high, consisting of a monosiphonous, once- or twice-branched stalk 6 mm × 300–500 µm arising from a rhizomatous base and bearing a terminal irregular blade 10–11 × 8–11 mm. Branching initially in one plane, with second- and third-order laterals in several planes but not forming a spongiose mass. Primary axes 182–230 µm wide, with ultimate branches 72–100 µm in diameter. Apices and lower segments of branches with frequent, more or less long, tapered and arcuate adventitious rhizoids up to 170 µm long. Branch anastomoses frequent, by means of haptera with crenulate pads. Cell division non-segregative; chloroplasts reticulate with numerous spherical pyrenoids 4–5 µm in diameter. Gametangia urceolate, 250–270 µm in diameter; terminal on third-order laterals.

Habitat and Remarks

Growing at a depth of 42 m, along with *Struvea elegans*.

Taylor (1945, p. 50, pl. 1, figs 1, 2) reports a stalked '*Boodlea composita*, forma' from Ecuador which could possibly represent *B. vanbosseae*, although his figures do not depict distinct adventitious rhizoids (a presumably variable feature).

Genus ***Cladophoropsis*** Børgesen 1905: 288; Papenfuss 1950: 208

Key to the Suva Lagoon and Reef Species of *Cladophoropsis*

1. Filaments 60–176 µm in diameter; terminal secondary holdfasts absent . . . . . *C. sundanensis*
   Filaments 400–450 µm in diameter; terminal secondary holdfasts present . . . . . *C. luxurians*

Cladophoropsis luxurians Gilbert 1962: 136, fig 3*A, B* (type locality: shore of Molokai opposite Mokuhooniki I., Hawaii) (Fig. 32)

Misapplied Name (fide *Gilbert 1962: 138*)

Cladophoropsis membranacea (C.Agardh) Børgesen; Egerod 1952: 356, fig. 3.

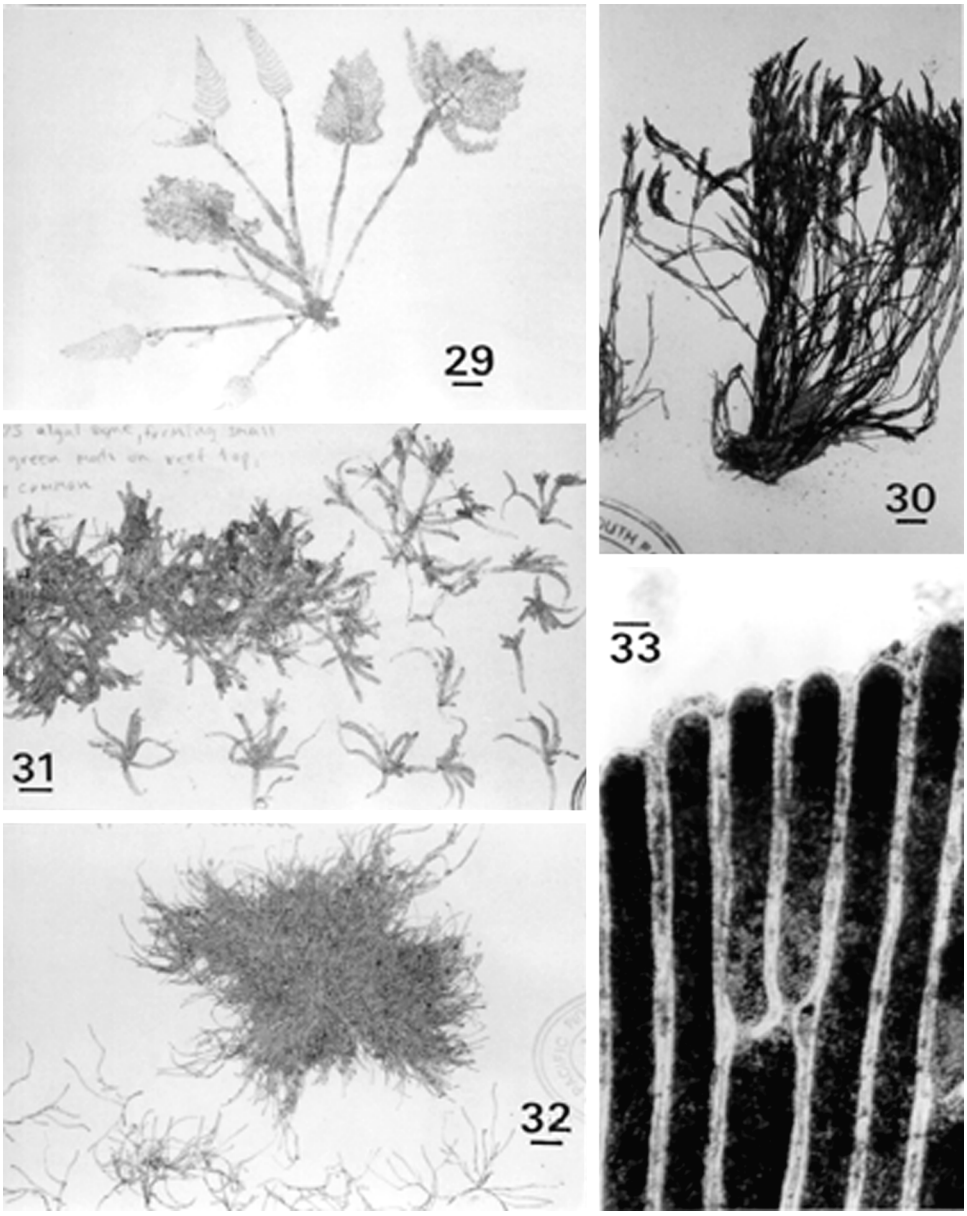


Fig. 29. *Struvea elegans*. General habit, showing plumose axes (SUVA (USP) 1139). Scale bar = 5 mm. **Fig. 30.** *Bryopsis pennata* var. *secunda*. Habit (SUVA (USP) 635). Scale bar = 5 mm. **Fig. 31.** *Valoniopsis pachynema*. Habit (SUVA (USP) 205). Scale bar = 5 mm. **Fig. 32.** *Cladophoropsis luxurians*. Habit (SUVA (USP) 35). Scale bar = 5 mm. **Fig. 33.** *Rhipidosiphon javensis*. Blade margin showing unequal dichotomies (SUVA (USP) S11: 2). Scale bar = 30 µm.

Fiji and Rotuma Records

Kasahara 1985: 32, pl. 5, fig. 1; 1988 (as *Cladophoropsis membranacea*).

Representative Material Examined

Nukubuco Pass, Laucala Bay, Suva (*Carlson*, 14.i.1973: SUVA (USP) 35); Suva Barrier Reef (*Kasahara*, 18.ix.1985: SUVA (USP) 33, as *Cladophoropsis membranacea*); Tekokota Atoll, Tuamotu Archipelago, French Polynesia (*Orempuller*, 22.xi.1996: *in Herb.* UFP).

Thallus dark green, up to 3 cm tall and forming small, tough mats on the reef top. Branching sparse to profuse and irregular, filaments 400–450 µm in diameter, with lateral branchlets secundly or irregularly issued from distal or proximal ends of mother cells, often curving downwards with frequent formation of secondary holdfasts form the tips of filaments. Cross-wall formed between branches; lateral branches without basal cross-walls but arising beneath a cross-wall of the supporting filament.

Habitat and Remarks

Growing on the reef crest.

The coarser habit, lack of lateral tenaculae and presence of terminal secondary holdfasts set *Cladophoropsis luxurians* apart from *C. membranacea* (C.Agardh) Børgesen (Gilbert 1962, p. 138). Kasahara (1985, p. 32, pl. 5, fig. 1) described a species under *C. membranacea* that showed terminal secondary holdfasts and a coarse habit and specimens from French Polynesia held in UPF also show similar characteristics. Previous records of *Cladophoropsis membranacea* from the southwestern Pacific region need to be checked, in view of the Fijian, Hawaiian and French Polynesian records of *C. luxurians*.

Cladophoropsis sundanensis Reinbold 1905: 147 (syntype localities: 'Timor; Laut; etc', Indonesia) (Fig. 16)

Fiji And Rotuma Records

South *et al*. 1993: 183; N'Yeurt 1996: 370, fig. 11; N'Yeurt *et al*. 1996*b*: 60.

Representative Material Examined

Rewa River Delta (*Raj*, 1993: SUVA (USP) S3: 7); Suva Point (*South*, 7.vii.1990: SUVA (USP) 457).

Plants tufted, greenish-brown, forming sediment-infiltrated cushions up to 15 mm high with filaments 60–176 µm in diameter; loosely branched with branchlets at 300–500-µm intervals along the main axis. Branches non-septate and entangled at the base, secund or irregular and projecting from the distal end of the primary axial cells, with a rhizoid arising from the base of most cells immediately above a lateral in open connection with the cell immediately below.

Habitat and Remarks

Growing as dense, sediment-infiltrated cushions or tufts in the lower intertidal.

The Fijian specimens closely fit the habitat description by Taylor (1950, p. 44), who most probably refers to this species under *C. zollingeri* (Kützing) Børgesen, as his *Bikini* specimens attain up to 175 µm in diameter. The type specimen of *C. zollingeri* has filaments in the range of 215–315 µm in diameter, in contrast to the filaments of *C. sundanensis*, which range from 60 to 175 µm in diameter (*vide* Howe 1914; Dawson 1956, p. 31; Cribb 1960).

Genus ***Dictyosphaeria*** Decaisne ex Endlicher 1843

Key to the Suva Lagoon and Reef Species of *Dictyosphaeria*

1. Thallus hollow ..... *D. cavernosa*
   Thallus solid ..... *D. versluysii*

Dictyosphaeria cavernosa (Forsskål) Børgesen 1932: 2, pl. 1, fig. 1; Dawson 1954: 388, fig. 8*i*

Basionym and Nomenclatural Synonymy

Ulva cavernosa Forsskål 1775: 187 (syntype localities: 'Gomfodae' (Al-Qunfidha), Saudi Arabia; Mokha, Yemen).

Fiji and Rotuma Records

Chapman 1971: 165 (as *D. favulosa*); Kapraun and Bowden 1978; Kasahara 1985: 34; 1988; South and Kasahara 1992: 48; N'Yeurt 1996: 371, fig. 12; N'Yeurt *et al.* 1996*b*: 60.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 107); Suva Barrier Reef (*Kasahara*, 16.ix.1985: SUVA (USP) 108; 18.ix.1985: SUVA (USP) 114).

Plants green, sessile, about 2–5 cm in diameter; sometimes spherical and often irregularly lobed. Thallus hollow, the walls 1-cell thick, with angular or polygonal cells clearly seen with the naked eye. Spinulous tenacula absent. Thallus lightly attached to substratum via small rhizoids.

Habitat and Remarks

Found in sheltered back-reef sites, often underneath flat coral rubble and in tide pools.

Dictyosphaeria versluysii Weber-van Bosse 1905: 144 ('*versluysi*') (syntype localities: 'Plusieurs récifs dans l'Archipel Malaisien'); Egerod 1952: 351, 354, 355, figs 1*a*, 2*h–k*; Valet 1966: 256, figs 1, 2

Taxonomic Synonymy

Synonymy is given in Valet (1966), who found that characters previously used to separate solid species of Dictyosphaeria of the versluysii group were overlapping and unreliable.

Fiji and Rotuma Records

Chapman 1971: 165; Kasahara 1985: 34, 1988; South 1991: 4; N'Yeurt *et al.* 1996*b*: 60.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 112); Suva Barrier Reef (*Kasahara*, 16.ix.1985: SUVA (USP) 675).

Thallus 1–1.5 cm in diameter, globular–aplanate and solid throughout, consisting of polygonal vesicles 0.4–1.3 mm in diameter adhering to each other by means of small hapteroid cells with attaching pads 75–80 µm in diameter. Simple or dichotomously branched spinulous travecula 15–20 × 80–100 µm projecting from vesicles. Thallus attached to substratum by sparse basal rhizoids.

Habitat and Remarks

Growing intertidally, attached to rocks and coralline substratum.

Genus ***Ventricaria*** J.L.Olsen et J.A.West 1988: 104
Ventricaria ventricosa (J.Agardh) J.L.Olsen et J.A.West 1988: 104, fig. 11

Basionym and Nomenclatural Synonymy

Valonia ventricosa J.Agardh 1887: 96 (syntype localities: St Croix, Virgin I.; Guadeloupe).

Fiji and Rotuma Records

Chapman 1971: 165 (as *Valonia ventricosa* J.Agardh); Kasahara 1985: 36; 1988 (as *Valonia ventricosa* J.Agardh); South 1991: 4; South and Kasahara 1992: 49; N'Yeurt 1996: 372, fig. 23; N'Yeurt *et al*. 1996*b*: 61.

Representative Material Examined

Makaluva I. (*Kasahara*, 22.ix.1985: SUVA (USP) 212).

Plants coenocytic and thin-walled dark green in colour, subspherical, spherical or pyriform, up to 5 cm in diameter; unbranched and aseptate with shiny and refractive cell wall. Tenacular and lenticular cells absent; attachment to substratum by minute basal rhizoids. Does not rupture if cell wall is punctured; it is denser than the surrounding water and sinks to the bottom when detached.

Habitat and Remarks

Grows solitarily or in groups of 3 or 4; attached basally to the substratum by minute rhizoids. Commonly found intertidally and up to a depth of 20 m, within coral cavities or attached to coral debris. Large, deep-water specimens are often covered with epiphytic crustose coralline algae.

Family **Valoniaceae** Nägeli 1847
Genus ***Valonia*** C.Agardh 1822*a*: 429

Key to the Suva Lagoon and Reef Species of *Valonia*

1. Vesicles ovoid ..... *V. utricularis*
   Vesicles cylindrical to clavate ..... *V. aegagropila*

Valonia aegagropila C.Agardh 1822*a*: 429 (lectotype locality: Venezia, Italy *fide* Egerod 1952: 348); Egerod 1952: 348, pl. 29*b*; Dawson 1954: 388, fig. 8*j*; 1956: 28

Fiji and Rotuma Records

Kapraun and Bowden 1978: 200; Kasahara 1985: 35, pl. 5, fig. 3; 1988; South and Kasahara 1992: 48; N'Yeurt 1996: 372, fig. 15*a*, *b*; N'Yeurt *et al*. 1996*b*: 60.

Thallus encrusting, dark to light olive-green, composed of cylindrical to clavate vesicles 3–13 × 1.5–3 mm, subdichotomously branched from the sides or the ends of the cells. Young plants attached to each other, the older ones more or less free.

Habitat and Remarks

This alga can form thick encrusting mats up to 10 mm thick over many square metres of back-reef rocks.

Valonia utricularis (Roth) C.Agardh 1823 (1822–1823): 431; Dawson 1956: 28, fig. 3

Basionym and Nomenclatural Synonymy

Conferva utricularis Roth 1797: 160, pl. I, fig. 1 (type locality: Mediterranean Sea).

Fiji and Rotuma Records

Kasahara 1985: 36, pl. 5, fig. 4; 1988; South 1991: 4; N'Yeurt *et al*. 1996*b*: 61.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 18.ix.1985: SUVA (USP) 207).

Thallus composed of a mass of clavate to ovoid vesicles 7–12 × 2.5–4.5 mm, with smaller vesicles irregularly issued from larger supporting vesicles.

Habitat and Remarks

Growing intertidally on the reef flat.

Genus ***Valoniopsis*** Børgesen 1934: 10
Valoniopsis pachynema (G.Martens) Børgesen 1934: 10–16, figs 1*a–f*, 2; Dawson 1957: 102, fig. 2 (Fig. 31)

Basionym and Nomenclatural Synonymy

Bryopsis pachynema G.Martens 1868: 24, 62, 63, pl. IV, fig. 2 (syntype localities: Benkulen (Bengkulu) and Pulau Tikus, near Bengkulu, Sumatra, Indonesia).

Fiji and Rotuma Records

Kasahara 1988; N'Yeurt *et al*. 1996*b*: 61.

Representative Material Examined

Suva Barrier Reef (*Carlson*, 14.i.1973: SUVA (USP) 205).

Thallus forming cushions up to 8 cm across and 3 cm high, composed of coenocytic, erect or arcuate, elongated cylindrical vesicles 1–1.5 mm in diameter. Branching irregular, with up to 5 basally septated branch segments in an umbellate apical cluster on parent segment. Basal rhizoids irregularly branched and tapered, without annular constrictions.

Habitat and Remarks

Growing on the reef crest, beyond Sandbank. This species was distributed without a description by Harvey (1857*a*: no. 73) as *Valonia confervoides* from Ceylon.

Order **Bryopsidales**
Family **Bryopsidaceae** Bory 1829: 203 ('Bryopsideae')
Genus ***Bryopsis*** Lamouroux 1809: 133

Bryopsis pennata Lamouroux var. ***secunda*** (Harvey) Collins et Hervey 1917: 62 (Fig. 30)

Basionym and Nomenclatural Synonymy

Bryopsis plumosa (Hudson) C.Agardh var. *secunda* Harvey 1858: 31, pl. XLVA, figs 1–3 (syntype localities: Key West and Sand Key, Florida, USA).

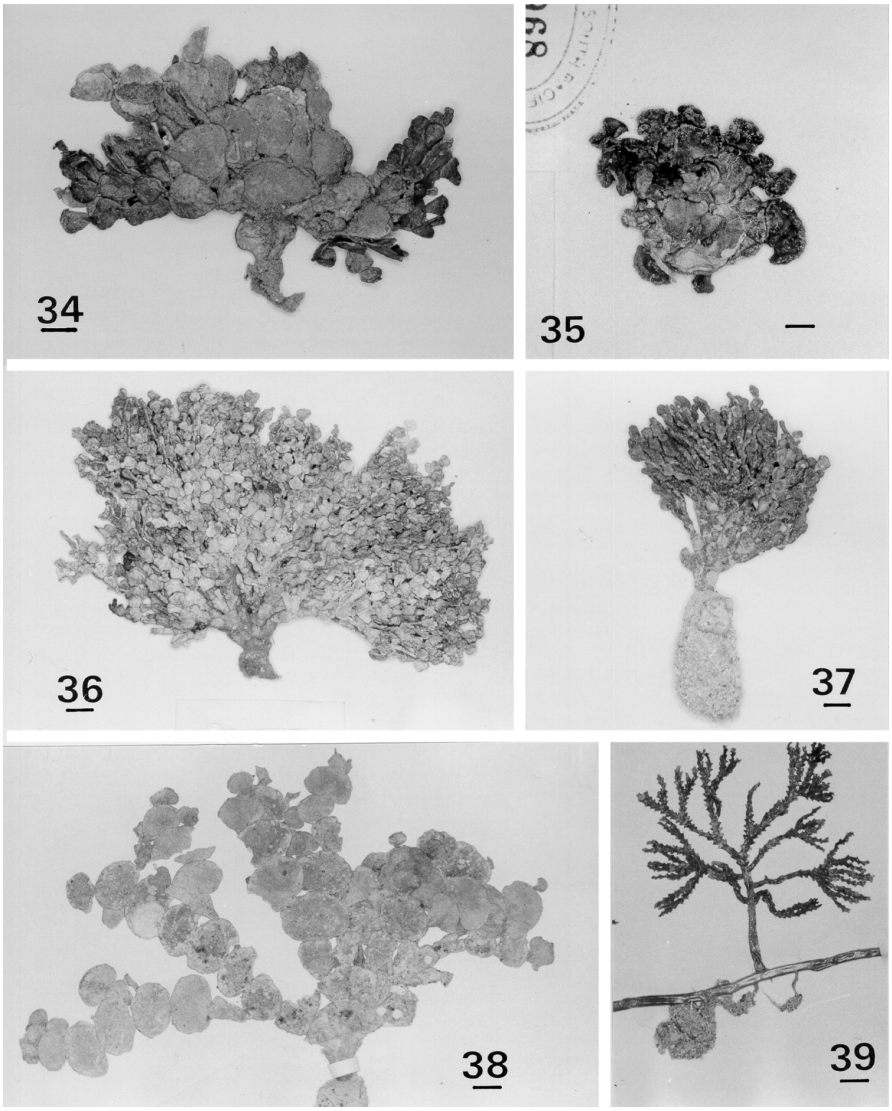


Fig. 34. *Halimeda discoidea*. Habit (SUVA (USP) 1168). Scale bar = 5 mm. **Fig. 35.** *Halimeda gigas*. Habit (SUVA (USP) 1169). Scale bar = 5 mm. **Fig. 36.** *Halimeda minima*. Habit (SUVA (USP) 176). Scale bar = 5 mm. **Fig. 37.** *Halimeda incrassata*. Habit. Scale bar = 5 mm. **Fig. 38.** *Halimeda macroloba*. Habit (SUVA (USP) 175). Scale bar = 10 mm. **Fig. 39.** *Caulerpa urvilliana*. Habit (SUVA (USP) 91). Scale bar = 5 mm.

Taxonomic Synonymy (fide *Silva* et al. *1996: 807*)

Bryopsis harveyana J.Agardh 1887: 82 (syntype localities: Florida, USA; Tonga).

Fiji and Rotuma Records

Kasahara 1985: 31, pl. 4, fig. 6; pl. 14, fig. *f*; 1988; South 1991: 5; South and Kasahara 1992: 49; N'Yeurt 1996: 373, fig. 48; N'Yeurt *et al*. 1996*b*: 61 (all as *B. harveyana* J.Agardh).

Representative Material Examined

Suva Barrier Reef (*Carlson*, 14.i.1973: SUVA (USP) 23 (as *B. pennatachrix*); *Kasahara*, 16.ix.1985: SUVA (USP) 21; *South*, 6.v.1993: SUVA (USP) S9: 2); Makaluva I. (*Seeto*, 8.vi.1993: SUVA (USP) 635, 639).

Thallus dark iridescent-green; in compact clumps 12–20 × 15 mm; main axis 195–200 µm in diameter and unbranched, with slight upward curvature. Secondary branches cylindrical to clavate, up to 1000 × 85 µm, with rounded apex and slight constriction (35–41 µm) at base. Branchlets occurring in an offset pair of lateral rows on one side of the primary axis, giving a uniseriate appearance to the thallus. Secondary branchlets typically longer in middle of axis, imparting a renoid curvature to the younger blades.

Habitat and Remarks

Grows in clumps, intertidally near the reef crest. The relationship between *Bryopsis plumosa* var. *secunda* and *B. harveyana* remains to be clarified, as described by Silva *et al*. (1996, p. 808). However, it seems likely that the Fijian plants and Harvey's Tongan specimen represent the same entity, considering their geographical proximity.

Family **Caulerpaceae** Greville ex Kützing
Genus ***Caulerpa*** Lamouroux 1809: 136, 332

Key to the Suva Lagoon and Reef Species of *Caulerpa*

1. Branchlets usually stalked, the ends generally sharply swollen or peltate 8
   Branchlets not stalked, ends not swollen or peltate 2
2. Uprights with successive whorls of fine mucronate branchlets . . . . . *C. webbiana*
   Uprights without successive whorls of fine mucronate branchlets 3
3. Erect axes usually less than 10 mm long, stolon very fine, less than 300 µm thick, alternately branched . . . . . *Caulerpa filicoides* var. *andamanensis*
   Erect axes more than 10 mm long, stolon at least 1 mm thick, not alternately branched 4
4. Assimilators flattened or compressed, not spirally twisted 5
   Assimilators angular to compressed, spirally twisted . . . . . *C. serrulata*
5. Assimilators simple and foliose, not opposite or in ranks . . . . . *C. brachypus* f. *parvifolia*
   Assimilators opposite or in ranks, not simple 6
6. Assimilators flattened, ramelli in one plane and oppositely arranged . . . . . *C. fergusonii*
   Assimilators terete to compressed, ramelli in more than one plane and not opposite 7
7. Ramelli small and densely arranged in ranks of threes; branchlets compressed, basally contracted and tapering gradually to mucronate apices . . . . . *C. cupressoides*
   Ramelli large and laxly arranged, not in regular ranks; branchlets cylindrical, basally broadened and tapering abruptly to mucronate apices . . . . . *C. urvilliana*
8. Ends of branchlets terminating abruptly in a peltate disk . . . . . *C. peltata*
   Ends of branchlets subspherical and inflated, not in a peltate disk . . . . . *C. racemosa*

Caulerpa brachypus Harvey f. ***parvifolia*** (Harvey) Cribb 1958: 209, figs 4–5 (Fig. 40)

Basionym and Nomenclatural Synonymy

Caulerpa parvifolia Harvey 1860: pl. CLXXII (type locality: Kiama, NSW, Australia).

Fiji and Rotuma Records

South and N'Yeurt 1993: 113, fig. 5; N'Yeurt *et al*. 1996*b*: 61.

Representative Material Examined

Nukulau I., Suva (*Carlson*, 20.viii.1972: SUVA (USP) 41).

Stolons thin, 0.5 mm in diameter, regularly branched and bearing erect, shortly stipitate blades. Distinguished from the typical form by the simple foliose blades up to (10)12 × (3)5 mm, with smooth or slightly toothed margins, the teeth simple.

Habitat and Remarks

Grows on the reef flat. The typical form, *Caulerpa brachypus* Harvey, is reported from Fiji by Kasahara (1985, p. 26) but the representative material was not deposited in SUVA and could not be located although it is believed to be now housed in Kagoshima University (H. Kasahara, pers. comm.).

Caulerpa cupressoides (Vahl) C.Agardh 1823: 441; Weber-van Bosse 1898: 323, pls 27, 28; Coppejans and Beeckman 1990: 113, figs 3–7; Coppejans 1992: 389, fig. 1*C* (as ecad *cupressoides*); Coppejans and Prud'homme van Reine 1992: 676, figs 2*A*, 8*A* (as ecad *cupressoides*); Verheij and Prud'homme van Reine 1993: 121, pl. 1, fig. 2

Basionym and Nomenclatural Synonymy

Fucus cupressoides Vahl 1802: 38 (type locality: St Croix, Virgin Is).

Fiji and Rotuma Records

Chapman 1977: 161; Kasahara 1988; South 1991: 5; South and Kasahara 1992: 49; South and N'Yeurt 1993: 112, fig. 7; N'Yeurt 1996: 375, fig. 24; N'Yeurt *et al*. 1996*b*: 61.

Representative Material Examined

Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) 770).

Plants forming dense aggregations, with a smooth spreading stolon up to 300 × 3 mm, anchored by numerous rhizoid-bearing branches spaced at close (0.5–1 cm) intervals. Foliar axes up to 4 cm tall, often strongly forked with subdichotomous branching. Ramelli oppositely pinnate and compressed, basally contracted with upward curving tendency, tapering to a sharp point at the tip and generally twice as long as the diameter of the supporting axis. The ramelli usually arranged in ranks of 3s, sometimes 2s or up to 5.

Caulerpa fergusonii G.Murray 1891: 212, pl. 53, figs 1, 2 (type locality: Sri Lanka); Coppejans and Prud'homme van Reine 1992: 690, figs 1*D–E*, 13*A–B* (Figs 41, 49*a–b*)

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 61.

Representative Material Examined

Outer slope of Fish Patch, Suva Barrier Reef (*Keats*, 13.x.1994: SUVA (USP) 812; 18.x.1994: SUVA (USP) 826–829).

Thallus with a ramified terete stolon up to 1.5 mm in diameter, attached to the substatum via rhizoids issued at the apex of downwardly growing branchlets 10–12 mm long. Upright branchlets 13–15 mm high, with segmented rachis. Segments of rachis wider apically, bearing at their upwardly oblique part two opposite, basally constricted, rounded and laterally compressed sessile branchlets 1.5–2 mm in diameter.

Distribution

Fiji; Sri Lanka; Indonesia, Tanzania, Philippines, New Caledonia.

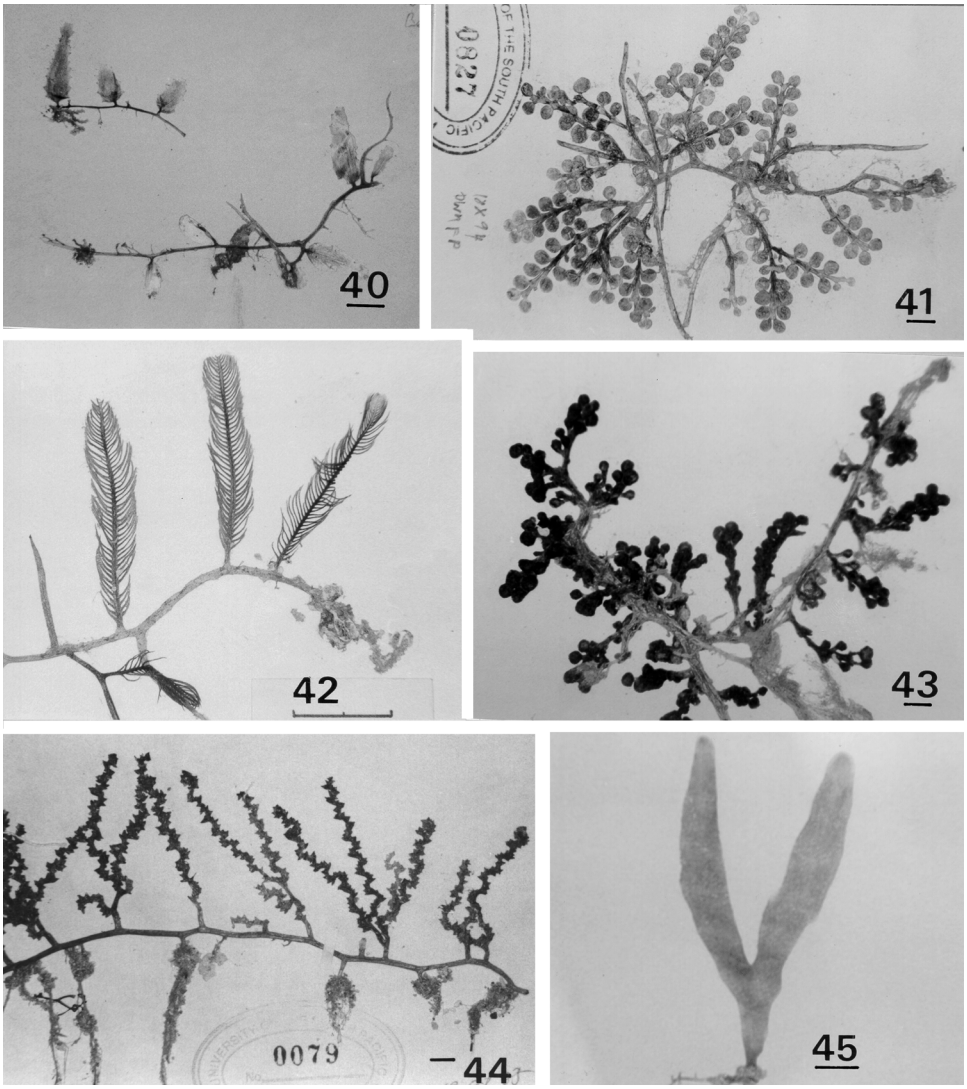


Fig. 40. *Caulerpa brachypus* f. *parvifolia*. Habit (SUVA (USP) 41). Scale bar = 5 mm. **Fig. 41.** *Caulerpa fergusonii*. Habit (SUVA (USP) 827). Scale bar = 5 mm. **Fig. 42.** *Caulerpa sertularioides*. Habit (SUVA (USP) 87). Scale bar = 20 mm. **Fig. 43.** *Caulerpa racemosa*. Habit (SUVA (USP) 1154). Scale bar = 5 mm. **Fig. 44.** *Caulerpa serrulata*. Habit (SUVA (USP) 79). Scale bar = 5 mm. **Fig. 45.** *Codium extricatum*. Habit (SUVA (USP) 1164). Scale bar = 5 mm.

Habitat and Remarks

Found growing at a depth of 32 m on the outer vertical reef slope, epiphytic on ascidians attached to *Neurymenia fraxinifolia* plants.

Caulerpa filicoides Yamada var. ***andamanensis*** W.R.Taylor 1966: 154–156, fig. 1 (type locality: north-east of Ritchie's Archipelago Andaman Is); Coppejans and Meinesz 1988: 184, figs 12, 13

Caulerpa filicoides Yamada 1936: 135, pl. 30, fig. 2 (syntype localities: Mikako and Naha, Ryukyu-retto, Japan.

Fiji and Rotuma Records

Kasahara 1988; South and Kasahara 1992: 49 (both as *C. acuta*); South and N'Yeurt 1993: 111, figs 1, 2; N'Yeurt *et al*. 1996*b*: 62.

Representative Material Examined

Makaluva I. (*Carlson*, 12.viii.1972: SUVA (USP) 38, as *C. acuta*; *Keats*, 26.vii.1994: SUVA (USP) S10: 10, S10: 11); Suva Barrier Reef (*Kasahara*, 8.ix.1985: SUVA (USP) 37; *Knight*, 22.ix.1994: SUVA (USP) 813).

Plants with rhizomes up to 6 cm × 165–230 µm, sparingly or closely covered with spines about 65 µm long. Hapteral filaments up to 400 µm long, terminally peltate or occasionally longer and rhizoidal. Uprights widely spaced, simple, to 0.17–2.0 mm tall, smooth or with numerous spines, divided at the top into broad foliar divisions, simple or once-dichotomous at the base; division planar, branching alternate to 2 or 3, rarely 4 orders, the ultimate ramelli up to 45 µm in diameter, terminally retuse, obtuse or pointed.

Habitat and Remarks

Grows in deep water, in shaded sites and on silt-covered coral.

Caulerpa peltata Lamouroux 1809: 332 (type locality: Antilles); Weber-van Bosse 1898: 373, pl. 31, fig. 9.

Taxonomic Synonymy

Caulerpa racemosa (Forsskål) J.Agardh var. *peltata* (Lamouroux) Eubank 1946: 421, fig. 2r, s; Coppejans and Beeckman 1989: 388, figs 27–29; Coppejans *et al*. 1995: 78, fig. 6 (as ecad *peltata*).

Fiji and Rotuma Records

Kasahara 1985: 30; Kasahara 1988; South 1991: 5; South and Kasahara 1992: 50; South and N'Yeurt 1993: 128, fig. 23; N'Yeurt 1996: 378, figs 31, 37; N'Yeurt *et al*. 1996*b*: 62 (all as *Caulerpa racemosa* var. *peltata*).

Representative Material Examined

Belcher Rocks (*Keats*, 27.xi.1994: SUVA (USP) 1167).

Plants small and delicate, occurring as single stolons up to 1 mm in diameter, occasionally forming clumps 5–10 cm across of densely intermingled plants, each about 8 cm long and sparingly provided with short rhizoidal branches. Spreading stolon bearing short cylindrical erect foliar axes 1–1.5 cm long at 2–3-mm intervals, these producing thin peltate discs 3–5 mm in diameter either singly at the end, or several discs axially arranged around the main foliar branches.

Habitat and Remarks

Growing on coral pieces, at a depth of 15–20 m.

Caulerpa racemosa (Forsskål) J.Agardh 1873: 35, 36; Weber-van Bosse 1898: 357, pl. 31, figs 5–8; pl. 32, figs 1–7; pl. 33, figs 1–23; Coppejans and Prud'homme van Reine 1992: 174 (as ecad *racemosa*); Coppejans *et al*. 1995*a*: 78, fig. 7 (as ecad *racemosa*) (Fig. 43)

Basionym and Nomenclatural Synonymy

Fucus racemosus Forsskål 1775: 191 (type locality: Suez, Egypt).

Fiji and Rotuma Records

Chapman 1971: 166; Kasahara 1985: 31; South 1991: 5; South and Kasahara 1992: 50; N'Yeurt 1996: 380, fig. 27*a*, *b*; N'Yeurt *et al*. 1996*b*: 62.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 18.ix.1985: SUVA (USP) 49); Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 62; *N'Yeurt*, 11.viii.1997: SUVA (USP) 1154).

Plants up to 15 cm long, with spreading stolon 3 mm in diameter and ventral branchlets beset with rhizoids. Ascending foliar axes up to 3 cm long, bearing up to 15 radially disposed stipitate ramelli with subspherical inflated ends 2–4 mm in diameter. Colour dark to light green, the larger plants noticeably paler in hue. Some plants (especially those in sandy locations) are provided with extensive rhizoids up to 15 mm long, covering some 30% of the spreading stolon.

Habitat and Remarks

Found in localised patches in the mid-reef area, for instance at Makaluva Island.

Caulerpa serrulata (Forsskål) J.Agardh 1837: 174; Dawson 1954: 393, fig. 10*a*; 1956: 38, fig. 23; 1957: 105; Valet 1968: 43, pl. 9, fig. 1; Meñez and Calumpong 1982: 9, pl. 2*E*; Coppejans and Beeckman 1989: 120, figs 24, 25; Littler *et al.* 1989: 44; Coppejans *et al.* 1992: 701, fig. 20*B* (as ecad *serrulata*); Verheij and Prud'homme van Reine 1993: 125, pl. 2, fig. 8; Coppejans *et al*. 1995*a*: 78, figs 9, 10 (Fig. 44)

Basionym and Nomenclatural Synonymy

Fucus serrulatus Forsskål 1775: 189 (type locality: Mokha, Yemen).

Fiji and Rotuma Records

Chapman 1971: 166; Kasahara 1985: 26; 1988; South 1991: 5; South and Kasahara 1992: 50; South and N'Yeurt 1993: 117, fig. 12; N'Yeurt 1996: 382, figs 30, 40; N'Yeurt *et al.* 1996*b*: 62.

Representative Material Examined

Namarai (*Kasahara*, 19.x.1985: SUVA (USP) 79; Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) 775).

Fairly large plants, with spreading stolon up to 200 × 2 mm, possessing ventral rhizoid-bearing branches and assimilators up to 7 cm tall at 1–4-cm intervals along the spreading stolon. The foliar branches several times dichotomously or irregularly branched, terete below up to point of dichotomy, the rest compressed (1–2 mm broad) with moderate to strong twisting and serrated margins; the serrations more pronounced on the outwardly facing edge of the twist.

Habitat and Remarks

Found growing on the reef flat and outer reef wall, up to about 10-m depth.

Caulerpa sertularioides (S.G.Gmelin) Howe 1905: 576 (type locality: 'Americae'); Eubank 1946: 417, fig. 2*c*, *d*; Coppejans and Meinesz 1988: 192, fig. 29; Coppejans and Beeckman 1990: 120, figs 26, 27; Coppejans *et al*. 1995*a*: 80, fig. 8 (Fig. 42)

Basionym and Nomenclatural Synonymy

Fucus sertularioides S.G.Gmelin 1768: 151, pl. XV, fig. 4 (type locality: 'in coralliis americanis').

Fiji and Rotuma Records

Chapman 1971: 166; Kasahara 1985: 27; 1988; South and Kasahara 1992:50; South and N'Yeurt 1993: 121, fig. 16; N'Yeurt *et al*. 1996*b*: 63.

Representative Material Examined

Makaluva I. (*Kasahara*, 22.ix.1985: SUVA (USP) 87; *South*, 9.ix.1991: SUVA (USP) 84).

Plants with terete stolons 0.25–1.0 mm in diameter, bearing sparse short branches with branched rhizoids. Uprights up to 6 cm tall, simple or occasionally (sub-)dichotomously divided, naked or branched at the base and bearing plumose, pinnate, undivided branchlets; branchlets cylindrical or slightly compressed, not contracted at the base, to 8 mm long, 200 μm in diameter, upcurved, with mucronate tips.

Habitat and Remarks

Plants are widely spreading and form loose colonies on sand and coral. Coppejans and Beeckman (1990) described two distinct forms of *C. sertularioides* from the Kenyan coast (with intermediates), a smaller, slender form and a longer, stouter form. Both of these forms seem to be represented in the Suva material.

Caulerpa urvilliana Montagne 1845: 21 (type locality: Toud I. (Warrior Islet), Torres Strait, Australia); Weber-van Bosse 1898: 318, pl. 26, figs 7–12; Taylor 1950: 60, pl. 31, fig. 1, pl. 32, fig. 1; Dawson 1956: 37, fig. 21; Coppejans 1992: 391, fig. 2 (as *C. cupressoides* ecad *urvilliana*); Coppejans and Prud'homme van Reine 1992: 686, figs 3*B*, 11*B* (as *C. cupressoides* ecad *urvilliana*) (Fig. 39)

Fiji and Rotuma Records

Chapman 1971: 166 (as *Caulerpa urvilliana* var. *vitiensis* Weber-van Bosse); Kasahara 1985: 28, pl. 4 fig. 4; 1988; South 1991: 5; South and Kasahara 1992:50; N'Yeurt *et al*. 1996*b*: 63.

Representative Material Examined

Toberua Pass, Viti Levu (*Kasahara*, 26.ix.1985: SUVA (USP) 91).

Plants large, with widely spreading stolon up to 3.5 mm in diameter, bearing cylindrical, descending branches with long branched rhizoids. Uprights terete, crowded or widely spaced, a few to several times dichotomously branched, or irregularly branched, 5–15 cm tall with uprights smooth below and terete above, 2.0–2.5 mm in diameter, in part compressed, heavily mamillate, with broad protrusions at the base and tapering abruptly to mucronate tips, multiseriate except in compressed portions.

Habitat and Remarks

Plants form loose populations on sandy substratum.

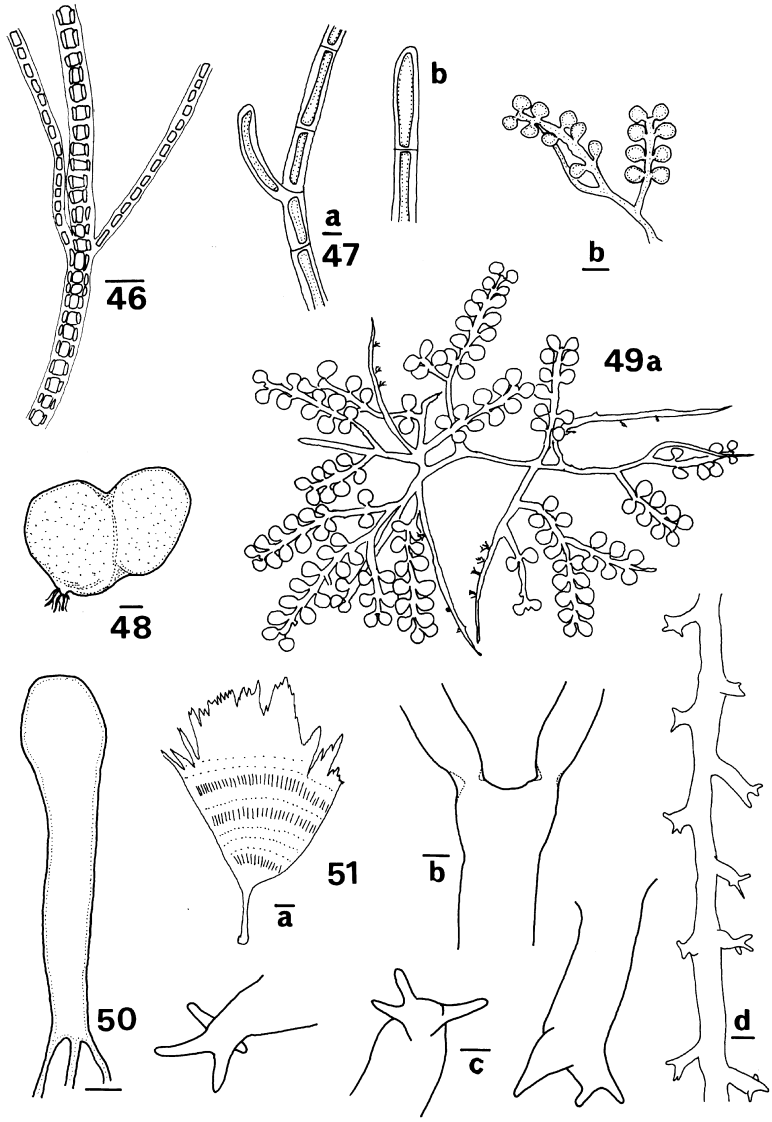


Fig. 46. *Enteromorpha flexuosa* subsp. *paradoxa*. Habit. Scale bar = 50 µm. **Fig. 47.** (*a*) *Cladophora coelothrix*. Detail of thallus septation (SUVA (USP) S8: 12). Scale bar = 100 µm. (*b*) Thallus apex. Scale bar = 100 µm. **Fig. 48.** *Codium mamillosum*. Habit (SUVA (USP) 669). Scale bar = 2 mm. **Fig. 49.** (*a*) *Caulerpa fergusonii*. Habit (SUVA (USP) 827). Natural size. (*b*) Detail of ramuli. Scale bar = 5 mm. **Fig. 50.** *Codium mamillosum*. Detail of utricle. Scale bar = 100 µm. **Fig. 51.** (*a*) *Rhipilia tenaculosa*. Habit (SUVA (USP) 786). Scale bar = 5 mm. (*b*) Detail of blade siphon with equal dichotomy. Scale bar = 50 µm. (*c*) Various morphologies of pronged lateral tenacula. Scale bar = 50 µm. (*d*) Blade siphon showing abundant lateral tenacula. Scale bar = 50 µm.

Caulerpa urvilliana var. *vitiensis* Weber-van Bosse was described from specimens by Sonder and Grunow collected from Fiji and Vanuatu and separated from the typical form by minor differences in the size and arrangement of the teeth. *Caulerpa urvilliana* is not readily distinguished from *C. cupressoides* and the variations in characters used to separate the two species often overlap in extensive collections (Trono 1968, p. 170).

Caulerpa webbiana Montagne 1837: 354 (type locality: Arrecife, Isla Lanzarote, Islas Canarias); Meñez and Calumpong 1982: 10, pl. 2*G–J*; Coppejans *et al*. 1995: 81, figs 13, 14 (as ecad *disticha*) (Fig. 74)

Fiji and Rotuma Records

Kasahara 1985: 28, pl. 5, fig. 5, pl. 14, fig. E (as *Caulerpa webbiana* Montagne f. *tomentella* Weber-van Bosse); Garbary *et al*. 1991: 252; South and Kasahara 1992: 50; South and N'Yeurt 1993: 124, fig. 15; N'Yeurt *et al*. 1996*b*: 63.

Representative Material Examined

Suva Barrier Reef, Viti Levu (*Kasahara*, 16.ix.1985: SUVA (USP) 095; 18.ix.1985: SUVA (USP) 097); Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 096).

Plants small, with terete, tomentose stolon and naked descending branches bearing branched rhizoids. Uprights 15–30 mm tall, irregularly branched 1–5 times and bearing whorls of fine branchlets with mucronate tips, giving the uprights a distinctive furry appearance.

Habitat and Remarks

Plants occur in thick cushions on exposed rocks on the reef. The distinctive habit of this species makes it easy to identify in the field.

Family **Codiaceae** (Trevisan) Zanardini
Genus ***Codium*** Stackhouse 1797: xvi, xxiv

Key to the Suva Lagoon and Reef Species of *Codium*

1. Thallus aplanate or terete 2
   Thallus globular . . . . . *C. mamillosum*
2. Thallus aplanate and unbranched, dorsiventral and convoluted, not terete . . . . . *C. arabicum*
   Thallus terete and dichotomously branched, not dorsiventral or convoluted 3
3. Thallus decumbent, with many attachment points . . . . . *C. geppiorum*
   Thallus wholly erect, with a single basal attachment point . . . . . *C. extricatum*

Codium arabicum Kützing 1856: 35, pl. 100, fig. 2 (type locality: Tor, Sinai Peninsula, Gulf of Suez, Egypt); Silva 1952*b*: 382, pl. 34*b*, figs 11–13; Dawson 1956: 38, fig. 24

Fiji and Rotuma Records

Chapman 1971: 165 (as *C. adhaerens*); Kasahara 1985: 14, pl. 1, fig. 3 (as *C. coronatum* var. *aggregata* Børgesen); South and Kasahara 1992: 50 (listed as both *C. coronatum* and *C. arabicum*); N'Yeurt 1996: 383, figs 41, 43, 59; N'Yeurt *et al*. 1996*b*: 63.

Representative Material Examined

Makaluva I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 99).

Thallus aplanate and dorsiventral, up to 15 cm broad and 1 cm thick; dark green and adhering strongly to the substratum. Orbicular excrescences present, with older plants assuming a convoluted habit. Medullary filaments 17–23 µm in diameter; peripheral utricles clavate to pyriform, 58–88 × 380–500 µm, with rounded apices.

Habitat and Remarks

Commonly found in intertidal patches on the mid-reef. Synonymy is given in Silva *et al.* 1996.

Codium extricatum P.C.Silva 1959: 145–147, fig. 17, pls XIII, XIV (type locality: mouth of Qolora River, Cape Province, South Africa); Jones and Kraft 1984: 263, figs 6*A–C*, 7*A–E*; Van den Heede and Coppejans 1996: 398, figs 10, 15 (Figs 45, 78*a*, *b*)

Fiji and Rotuma Records

N'Yeurt 1997: 85.

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 27.xi. 1994: SUVA (USP) 1164, S14: 12); Sandbank Passage, Suva Reef (*N'Yeurt and Skelton*, 14.viii.1998: SUVA (USP) 5499, 5500).

Thallus about 55–310 mm high, erect and solitary, arising from a single basal holdfast. Stipe slightly tapered and compressed, 13 × 3–4 mm. Upper thallus repeatedly dichotomously branched (up to 5 times) and terete, 5–6 mm in diameter. Medullary filaments 36–45 µm in diameter, 1–3 issued from the base of each utricle, with the point of juncture usually separated by a plug about 25 µm long. Utricles clavate to subcylindrical, 818–910 × 180–272 µm, with truncate apices. Gametangia ellipsoid and pyriform, 272–318 × 72–110 µm, shortly pedicellate around median section of utricles; usually a single lateral gametangium per utricle.

Habitat and Remarks

Growing as solitary plants at 15–20-m depth at Belcher Rocks and Sandbank Passage, in areas of high turbidity. The distinctively dichotomous habit and single attachment point of this species make it easily recognisable in the field.

Codium geppiorum O.C.Schmidt 1923: 50, fig. 33 ('*geppii*'); Van den Heede and Coppejans 1996: 400, figs 11, 16 (Fig. 68)

Basionym and Nomenclatural Synonymy

Codium divaricatum A.Gepp et E.S.Gepp 1911: 136, 145, pl. XXII, figs 195–199, nom. illeg. (syntype localities: Kai Is and Celebes, Indonesia). Full synonymy is given in Silva *et al*. 1996.

Fiji and Rotuma Records

Chapman 1971: 165 (as C. geppii); Kasahara 1985: 15, pl. 1, fig. 4; pl. 14, fig. *A* (as *C. bulbopilum*); 1988 (as *C. geppii*); South 1991: 5 (as *C. 'bolbopilum'*); 1993: 339; South and Kasahara 1992: 50; N'Yeurt 1996: 384, figs 42, 45 (as *C. bulbopilum*); N'Yeurt *et al.* 1996*b*: 63 (as *C. geppii*).

Representative Material Examined

Suva Barrier Reef (*VV,* 25.viii.1992: SUVA (USP) 106); Makaluva I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 98, as *C. bulbopilum*); Suva Barrier Reef (*South*, 20.i.1992: SUVA (USP) 647; 6.v.1993: SUVA (USP) 634, both as *C. bulbopilum*)

Thallus dark green, terete and imbricating with axes arching downwards; attached at various points to the substratum. Branching irregularly dichotomous, axes up to 2–3 × 80 mm. Medullary filaments 35–41 mm in diameter, up to 2 arising per utricle. Peripheral

utricles obovoid, cylindrical to subspherical 140–235 × 382–500 µm with rounded apices and occasional hairs up to 29 µm in diameter arising from the apical zone.

Habitat and Remarks

Growing intertidally on the reef flat.

Codium mamillosum Harvey 1855: 565; 1858*b*: pl. XLI, figs 1–4 (lectotype locality: Swan River, Western Australia); Okamura 1915: 151, pl. CXXXV, figs 10–16; Silva 1952*b*: 389, fig. 16, pl. 35*a*; Silva and Womersley 1956: 269, fig. 6; Womersley 1984: 230, figs 77*A*, 78*A*; Abbott 1986: 162, fig. 1 (Figs 48, 50, 69)

Basionym

Lamarckia mamillosa (Harvey) Kuntze 1891: 900.

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 63.

Representative Material Examined

Fish Patch, Suva Harbour (*Keats*, 10.v.1994: SUVA (USP) 669, 784).

Non-Fijian Material Examined

Holdfast Bay, South Australia (*J. R. Harris*, vii.1943: AKU A1797*d*).

Plants spherical, solid, 9–12 mm in diameter. Utricles large and visible to the naked eye, up to 300–620 µm × 3–4 mm. Has a single basal point of attachment to substratum. Plants lustrous when dry, non-adhering to the paper.

Habitat and Remarks

Commonly found in local patches, attached to *Acropora* coral debris at a 15–20-m depth on the outer reef wall. The Fijian material was examined by Professor P. C. Silva and Dr F. Pedroche of the University of California at Berkeley, who confirmed the identification.

Family **Halimedaceae**

Genus ***Halimeda*** Lamouroux 1812: 186

Key to the Suva Lagoon and Reef Species of *Halimeda*

1. Distinct bulbous holdfast present 6
   Distinct bulbous holdfast absent 2
2. Segments ribbed; decalcified cortical utricles rounded and slightly adhering in surface view . . . . . *H. opuntia*
   Segments not ribbed 3
3. Plants fragile, friable; surface of segments dull, rugose, noticeably pitted; decalcified cortical utricles of mature thallus large, rounded and separate in surface view . . . . . *H. macrophysa*
   Plants not fragile or friable; segments not dull, rugose or noticeably pitted; decalcified cortical utricles of mature thallus small, hexagonal to subhexagonal and adhering to each other in surface view 4
4. Segments 2–4 mm wide and 1–4 mm high, frequently trilobed . . . . . *H. minima*
   Segments up to 40 mm wide and 30 mm high, not trilobed 5
5. Peripheral utricles 135–157 µm in diameter . . . . . *H. gigas*
   Peripheral utricles 42–43 µm in diameter . . . . . *H. discoidea*
6. Segments large, up to 30 mm wide and 20 mm high; decalcified cortical utricles of mature thallus rounded and separate from each other in surface view . . . . . *H. macroloba*

Segments small, up to 8 mm wide and 6 mm high, decalcified cortical utricles of mature thallus hexagonal and adhering to each other in surface view 7
7. Segments thick and heavily calcified, peripheral utricles 26–27 µm in diameter . . . . . *H. simulans*
Segments thin and lightly calcified, peripheral utricles 40–50 µm in diameter . . . . . *H. incrassata*

Halimeda discoidea Decaisne 1842: 102 (type locality: 'Kamschatka', Russia *fide* Silva *et al*. 1987); Egerod 1952: 398, pl. 38, fig. 19*b–d*; Hillis 1959: 352, pl. 2, fig. 5; pl. 5, fig. 11; pl. 6, fig. 11; pl. 7, figs 9, 10; pl. 8, figs 5–8; pl. 11; Hillis-Colinvaux 1980: 136, fig. 41; Verheij and Prud'homme van Reine 1993: 135, pl. 5, fig. 3 (Figs 23*a–b*, 34)

Fiji and Rotuma Records

Chapman 1971: 166; Kasahara 1988, South 1992: 6, figs 15–17; South and Kasahara 1992: 18; N'Yeurt 1996: 386, figs 67, 79; N'Yeurt *et al*. 1996*b*: 64.

Representative Material Examined

Fish Patch (*Gussmann*, 20.vi.997: SUVA (USP) 1168).

Plants up to 7 cm tall, single, short, stalk-like segment at base; lightly calcified, light green to cream in colour. Segments large (up to 20 × 15 mm) and in a single plane, mostly branching dichotomously. Peripheral utricles hexagonal in surface view, between 42–43 µm in diameter. Secondary utricles up to 128 µm in diameter, distinctly inflated, supporting up to 5 primary utricles. Cortex generally 2-layered.

Habitat and Remarks

Growing intertidally on the reef flat.

Halimeda gigas W.R.Taylor 1950: 84, pl. 44 (type locality: Enewetak (Eniwetok) Atoll, Marshall Is); Hillis 1959: 350, pls 1, 5, 6, 9; Hillis-Colinvaux 1980: 132, fig. 39 (Figs 24*a–b*, 35)

Fiji and Rotuma Records

N'Yeurt 1997: 92.

Representative Material Examined

Nukulau I. (*Gussmann*, 30.x.1996: SUVA (USP) 968).

Plants to 30 mm high, branching complanate. Segments discoidal to reniform, 10–12 × 6–8 mm. Cortex 2- or 3-layered, outermost utricles large, 135–157 µm in diameter, hexagonal in shape and remaining attached following decalcification. Secondary utricles 95–107 µm in diameter, each usually supporting 3 primary utricles. Nodal medullary filaments mostly completely fused in 2s or 3s.

Habitat and Remarks

Growing on the reef flat. It is biogeographically significant that this predominantly Micronesian species is now reported from Fiji. It is not known to occur in localities east of Fiji.

Halimeda incrassata (Ellis) Lamouroux 1816: 307; Hillis 1959: 365, pl. 4, figs 1, 2, pl. 5, fig. 21, pl. 6, figs 21–24, pl. 12 (Figs 26*a*, *b*, 37)

Basionym and Nomenclatural Synonymy

Corallina incrassata Ellis 1768: 408, pl. XVII, figs 20–27 (type locality: West Indies).

Fiji and Rotuma Records

Askenasy 1888; Chapman 1971: 165; Kasahara 1985: 20, pl. 3, fig. 2; South 1991: 5; 1992: 7, figs 23–25; N'Yeurt et al. 1996*b*: 64.

Representative Material Examined

Suva Barrier Reef (*Gussmann*, 26.ix.1997: SUVA (USP) 1169).

Thallus up to 5 cm tall, with a distinct bulbous holdfast up to 3 × 1.5 cm. Branching polychitomous from a basal segment about 10 × 5 mm; upper segments 2–4 × 3–6 mm, cuneate to trilobed, sometimes cylindrical; not distinctly ribbed. Cortex 2- or 3-layered, primary utricles hexagonal in surface view, 40–50 µm in diameter, remaining loosely attached following decalcification. Tertiary utricles 64–71 µm in diameter, dichotomously branched, bearing a pair of secondary utricles 36–43 µm in diameter, in turn bearing 2 or 3 primary utricles each. Well-developed nodal fusion plate present.

Habitat and Remarks

Growing on the reef flat.

Halimeda macroloba Decaisne 1841: 118 (type locality: Red Sea); Hillis 1959: 375, pl. 3, fig. 3, pl. 5, figs 19, 20, pl. 6, fig. 17, pl. 12; Hillis-Colinvaux 1980: 108–110, fig. 28; Verheij and Prud'homme van Reine 1993: 136, pl. 5, fig. 7; Coppejans *et al*. 1995*a*: 86, fig. 25 (Fig. 38)

Fiji and Rotuma Records

Chapman 1971: 165; Kasahara 1985: 20, pl. 2, fig. 4; 1988; South 1991: 5; 1992: 8, figs 12–14; South and Kasahara 1992; N'Yeurt *et al*. 1996*b*: 64.

Representative Material Examined

Suva Barrier Reef (*Carlson*, 25.ii.1973: SUVA (USP) 175; *South*, 25.i.1992: SUVA (USP) 738).

Thallus up to 15 × 20 cm, with a large bulbous and incrustated holdfast 30–40 × 15–20 mm. Segments subcuneate to reniform, not ribbed, about 1–2 mm thick and up to 30 mm wide and 20 mm high. Branching planar to bushy, di- to polychitomous. Calcification moderate; basal segment compressed and supporting several separate or laterally consolidated segments forming a fan-shaped unit. Cortex of 3 or 4 layers of utricles, the last layer 25–45 µm in diameter, rounded and remaining separate in surface view following decalcification. Nodal filaments united and porous.

Habitat and Remarks

This species has the largest segments and is commonly found in calm areas subject to much sedimentation (e.g. in the lagoon, mangrove swamps and estuaries). The broad segments are often the host to a number of epiphytic algae.

Halimeda macrophysa Askenasy 1888: 14, pl. IV, figs 1–4 (type locality: Makutu I., Fiji); Dawson 1957: 108, fig. 12; Hillis 1959: 361, pl. 2, fig. 3; pl. 5, fig. 16; pl. 6, fig. 8; pl. 11; Hillis-Colinvaux 1980: 134, figs 40, 99; Verheij and Prud'homme van Reine 1993: 136, pl. 6, fig. 1; Coppejans *et al*. 1995*a*: 86, fig. 26.

Fiji and Rotuma Records

Chapman 1971: 166; Kasahara 1985: 21; South 1992: 8, figs 12–14; South and Kasahara 1992: 18; N'Yeurt 1996: 387, figs 71, 80; N'Yeurt *et al*. 1996*b*: 64.

Representative Material Examined

Makaluva I. (*Kasahara*, 19.x.1986: SUVA (USP) 416).

Plants up to 50 × 100 mm, arising from a single small holdfast and spreading outward in a cushion-like manner. Segments fragile and reniform, up to 20 × 10 mm, outer margins often undulated. Colour pale green to white on drying, dull and moderately calcified with characteristic flexibility. Peripheral utricles large, rounded and separate following decalcification, about 100 µm in diameter. Secondary utricles dichotomously branched.

Habitat and Remarks

Grows intertidally on the reef flat.

Halimeda minima (W.R.Taylor) Colinvaux 1968: 32, figs 5, 6; Hillis-Colinvaux 1980: 113, fig. 30 (Figs 25, 36)

Basionym and Nomenclatural Synonymy

Halimeda opuntia (Linnaeus) Lamouroux forma *minima* W.R.Taylor 1950: 82, 83, 206, pl. 39, fig. 2 (type locality: Bikini Atoll, Marshall Is).

Fiji and Rotuma Records

Garbary *et al*. 1991: 252; South 1992: 8, fig. 34; N'Yeurt *et al*. 1996*b*: 64.

Representative Material Examined

Suva Barrier Reef (*Würtz*, 18.viii.1992: SUVA (USP) 176).

Plants bushy, 5–7 cm tall, with a single minute holdfast about 6 × 3 mm. Segments small, 2–4 × 1–4 mm, frequently trilobed in lower portions of thallus; moderately calcified and rugose-pitted in appearance. Cortex up to 4-layered; outermost utricles 15–25 µm in diameter, subhexagonal and adhering slightly after decalcification. Medullary nodal filaments united in 2s or 3s.

Habitat and Remarks

Growing in deep water, at a depth of about 40 m on outer reef slope.

Halimeda opuntia (Linnaeus) Lamouroux 1812: 186; Egerod 1952: 397, pl. 3, fig. 19*a*, *e*, *f*; Dawson 1954: 395, fig. 12; Hillis 1959: 359, pl. 2, figs 7, 8; pl. 5, figs 3, 4; pl. 6, fig. 6; pl. 7, fig. 3; pl. 10; Hillis-Colinvaux 1980: 110, figs 19, 51, 92; Verheij and Prud'homme van Reine 1993: 137, pl. 6, figs 5, 6; Coppejans *et al*. 1995*a*: 86, fig. 27

Basionym and Nomenclatural Synonymy

Corallina opuntia Linnaeus 1758: 805, p.p. (type locality: Jamaica).

Fiji and Rotuma Records

Askenasy 1888; Chapman 1971: 166; Kasahara 1985: 22, pl. 2, fig. 3; Kasahara 1988; South 1991: 5; South 1992: 9, figs 26–28; South and Kasahara 1992: 51; N'Yeurt 1996: 389, figs 70*b*, 83; N'Yeurt *et al*. 1996*b*: 64.

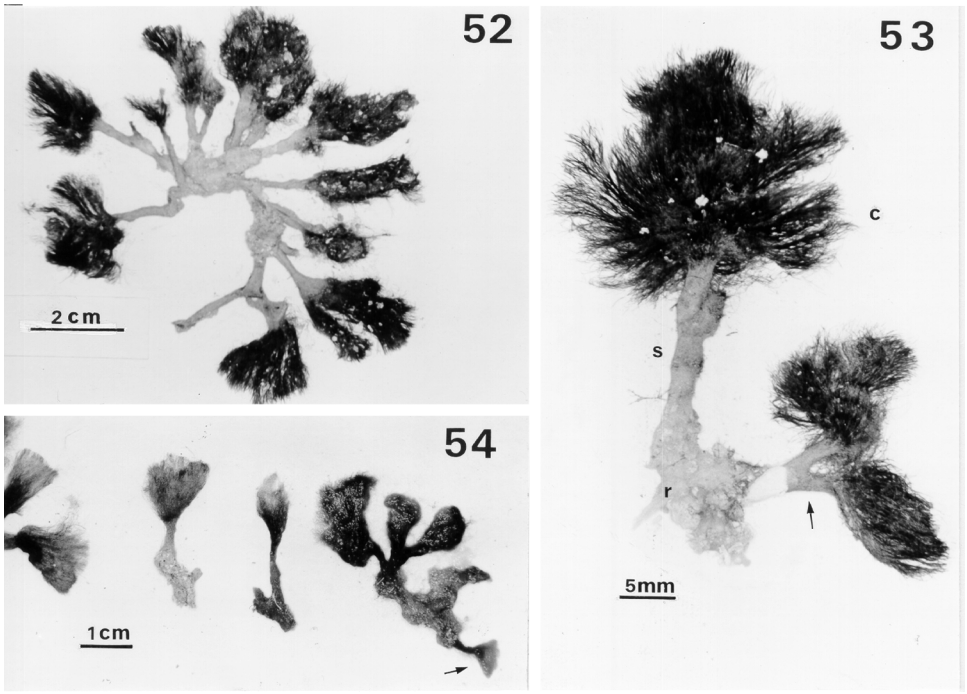


Fig. 52. *Rhipilia penicilloides*. Habit of the holotype (L 996. 175... 691) showing the extensive creeping stolon bearing multiple erect thalli. Scale bar = 2 cm. **Fig. 53.** *Rhipilia penicilloides*. Detail of erect adult thalli (SUVA (USP) 917), showing the rhizome (r), stipe (s), penicillate capitulum (c) and dichotomous branching of the stipe (arrow). Scale bar = 5 mm. **Fig. 54.** *Rhipilia penicilloides*. Various stages of development in juvenile plants, showing the laxly woven, infundibular capitulum of young thalli (arrow). (From l. to r.: SUVA (USP) 919, USP 921, USP 920, USP 916). Scale bar = 1 cm.

Representative Material Examined

Makaluva I. (*Kasahara*, 22.ix.1985: SUVA (USP) 177); Suva Barrier Reef (South, 28.i.1992: SUVA (USP) 740).

Plants bushy and possessing multiple attachment points; branching dense and irregular to opposite, in many planes. Clumps up to 10 cm in diameter, 6 cm high. Segments 10 × 5 mm, reniform, ribbed and trilobed at base of plant. Colour light to dark green, basal segments often white. Cortical utricles 10–12 µm in diameter, small, rounded and slightly adhering in surface view following decalcification. Secondary utricles slender and fork-shaped, arising as dichotomies of the medullary filaments.

Habitat and Remarks

The Suva Lagoon plants are similar to *Halimeda opuntia* (Linnaeus) Lamouroux var. *opuntia* Hillis 1959: 360, pl. 2, fig. 8; pl. 5, fig. 3; Chapman 1977: 162; Wynne 1993: 23, fig. 11.

Halimeda simulans Howe 1907: 503, pl. 29 (type locality: Culebra I., Puerto Rico); Hillis 1959: 368, pl. 3, fig. 4, pl. 5, fig. 27; pl. 6, fig. 15; pl. 11; Valet 1968: 48, pl. 9(4), fig. 3; Hillis-Colinvaux 1980: 103, fig. 26; Verheij and Prud'homme van Reine 1993: 138, pl. 6, fig. 7

Fiji and Rotuma Records

Kasahara 1985: 22, pl. 3, fig. 1; pl. 14, fig. *D*; Kasahara 1988; South 1992: 10, figs 29–31; South and Kasahara 1992: 51; N'Yeurt 1996: 390, figs 76, 85; N'Yeurt *et al*. 1996*b*: 64.

Representative Material Examined

Suva Barrier Reef (*Carlson*, 19.x.1972: SUVA (USP) 155); Suva Point (*Carlson*, 25.ii.1973: SUVA (USP) 154).

Plants up to 9 cm tall, relatively heavily calcified. Colour dull greenish-cream. Branching di- to tetrachotomous; basal holdfast well developed, up to 15 mm high. Segments up to 8 × 6 mm, frequently ribbed, trilobed at base and becoming subcuneate to reniform at outer portions. Peripheral utricles hexagonal in surface view, 26–27 µm in diameter. Secondary utricles up to 27 µm broad, supporting up to 3 primary utricles.

Habitat and Remarks

Found on the reef flat, intertidally.

Halimeda tuna (Ellis et Solander) Lamouroux 1812: 186; Hillis 1959: 342, pls 1, 5, 6, 9; Hillis-Colinvaux 1980: 122, fig. 35; Verheij and Prud'homme van Reine 1993: 139, pl. 6, fig. 9

Basionym and Nomenclatural Synonymy

Corallina tuna Ellis et Solander 1786: 111, pl. 20, fig. *e* (type locality: Mediterranean Sea).

Fiji and Rotuma Records

Chapman 1971: 166 1977; Kasahara 1985: 23, pl. 2, fig. 1; Kasahara 1988; South 1992: 10, figs 35–38; South and Kasahara 1992: 51; N'Yeurt 1996: 391, figs 73, 75, 87, 88; N'Yeurt *et al*. 1996*b*: 65.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 11.ix.1985: SUVA (USP) 160; 13.ix.1985: SUVA (USP) 161).

Plants up to 13 cm tall, often with holdfast up to 40 mm long. Lightly calcified, basal segments rather more whitish than rest of plant, usually light to dark green and shiny. Basal segments reniform to deltoid, up to 15 × 10 mm. Outer segments smaller, deltoid to subcuneate, up to 5 × 7 mm. Cortical utricles about 40 µm in diameter, hexagonal and adhering well to each other in surface view following decalcification. Secondary utricles somewhat inflated, di- to trichotomously branching.

Habitat and Remarks

Grows intertidally on the reef flat.

Family ***Udoteaceae*** (Endlicher) J.Agardh
Genus ***Avrainvillea*** Decaisne 1842: 108

Avrainvillea erecta (Berkeley) A.Gepp et E.S.Gepp 1911: 29–32, pl. X, fig. 89; Dawson 1954: 395, Fig. 13*a*; Valet 1968: 50, pl. 11(6), fig. 5; Olsen-Stojkovich 1985: 22, fig. 11, pl. 3*a* (Fig. 71)

Basionym and Nomenclatural Synonymy

Dichonema erectum Berkeley 1842: 157, pl. VII, fig. 11 (type locality: Philippines Is).

Fiji and Rotuma Records

Kasahara 1985: 16; N'Yeurt *et al*. 1996*b*: 65.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 005).

Thallus up to 6 cm high, consisting of a flabellate, reniform blade 3–4 cm wide and a prominent unbranched stipe 1–2 cm long. Margins smooth, faintly zonate and not lacerate. Siphons bright orange to yellowish brown, 30–50 µm in diameter; cylindrical with deeply constricted equal dichotomies and rounded apices.

Habitat and Remarks

Growing in a silty channel, on the reef flat at Nukulau Island.

Genus ***Chlorodesmis*** Harvey et Bailey 1851: 373
Chlorodesmis fastigiata (C.Agardh) Ducker 1969: 17, fig. 1; Coppejans and Prud'homme van Reine 1989*b*: 127, pl. 3, figs 1–4, 12 (Fig. 73)

Basionym and Nomenclatural Synonymy

Vaucheria fastigiata C.Agardh 1824: 176 (type locality: Mariana Is).

Fiji and Rotuma Records

Chapman 1971: 164 (as *Chlorodesmis comosa*); Kasahara 1985: 17, pl. 4, fig. 2; 1988; South 1991: 5; N'Yeurt *et al*. 1996*b*: 65.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 025); Suva Barrier Reef (*Carlson*, 14.i.1973: SUVA (USP) 024; *Kasahara*, 10.ix.1985: SUVA (USP) 031).

Thallus up to 3 cm high, consisting of bright green tufts of free filaments, with a short basal spongy filamentous holdfast. Filaments cylindrical, 60–100 µm in diameter, distally dichotomously to trichotomously branched with unequal constrictions above dichotomies.

Distribution

Tropical Indian and Pacific oceans.

Habitat and Remarks

Commonly found on the reef flat, forming bright green wavy tufts.

Genus ***Rhipidosiphon*** Montagne 1842*a*: 14–15
Rhipidosiphon javensis Montagne 1842*a*: 14–15 (type locality: Leiden I. (Nyamuk-besar), near Jakarta, Java, Indonesia); Littler and Littler 1990: 35; Verheij and Prud'homme van Reine 1993: 140, pl. 7, fig. 6 (Fig. 33)

Taxonomic Synonymy

Udotea javensis (Montagne) A.Gepp and E.S.Gepp 1904: 363; Egerod 1952: 379, fig. 10; Dawson 1954: 395, fig. 13*b*, *c*; Coppejans and Prud'homme van Reine 1989a: 139, pl. 10, figs 3–9.

Fiji and Rotuma Records

Kasahara 1985: 24; 1988 (as *Udotea javensis*); South 1991: 5; South and Kasahara 1992: 52; N'Yeurt 1996: 394, fig. 61; N'Yeurt *et al*. 1996*b*: 65.

Representative Material Examined

Makaluva Is (*Keats*, 26.vii.1994: SUVA (USP) S11: 2).

Thallus yellow-green, up to 7 × 5 mm, terminal fan-shaped blade calcified, rounded at outer margins and cuneate at base; consisting of a single layer of parallel filaments 35–40 µm broad (outer margins) to 80–105 µm broad (base of thallus) with characteristic unequal constrictions above each dichotomy. Stipe up to 200 µm in diameter, filamentous and uncorticated, mostly uncalcified and monosiphonous. Stipe anchored by fine, translucent hyaline rhizoids.

Habitat and Remarks

This genus was resurrected by Farghaly (1980, p. 251) and circumscribed by Littler and Littler (1990), for the widespread *Udotea javensis* (Montagne) A.Gepp et E.S.Gepp.

Genus ***Rhipilia*** Kützing 1858: 12, pl. 28

Key to the Suva Lagoon and Reef Species of *Rhipilia*

1. Frond penicillate, filaments mostly free ..... *R. penicilloides*
   Frond flabellate, filaments laterally attached ..... *R. tenaculosa*

Rhipilia penicilloides N'Yeurt et Keats 1997: 172, figs 1–16 (type locality: Suva, Fiji) (Figs 52–67)

Fiji and Rotuma Records

N'Yeurt and Keats 1997: 172, figs 1–16.

Representative Material Examined

Holotype: Sand Bank, Suva Barrier Reef (Keats, 22.x.1994: #GB 001, deposited in L, H. L. B. no. 996. 175... 691); isotypes: Suva Barrier Reef (*Keats*, 22.x.1994: #GB 003, deposited in BM, no. 54809; #GB 004, deposited in MELU; #GB 005 deposited in NSW; #GB 006, deposited in SAP, no. 062212); Suva Barrier Reef (Keats, 21.ix.1994: SUVA (USP) 808-810; 19.x.1994: SUVA (USP) 918; 22.x.1994: SUVA (USP) 915, 917, 919, 920; Yeo, 19.ii.1995: SUVA (USP) 916, 921).

A full description of the species is given in N'Yeurt and Keats 1997.

Habitat and Remarks

Colonies growing in sandy substratum or on coral rubble in the spur and groove zone of Sand Bank, Suva Barrier Reef, at a 6–10-m depth. The penicilloid capitula of the adult plants have a characteristic sway and fluidity in the water currents, contrasting with the rigid erect stipes.

This species has strong affinities to both the genera *Rhipilia* and *Chlorodesm*is, a full discussion of which is given in N'Yeurt and Keats (1997).

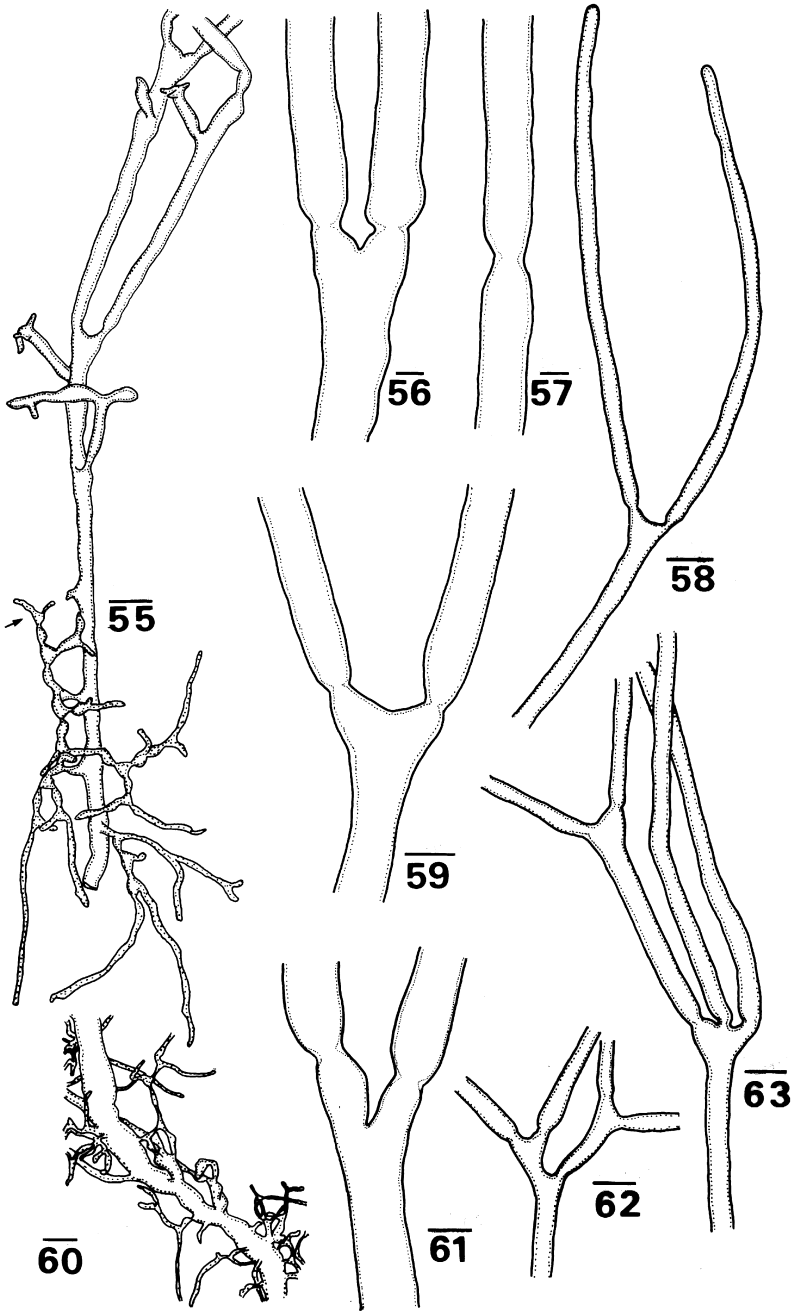


Fig. 55. *Rhipilia penicilloides*. Single siphon dissected out from upper portion of the adult stipe, with lateral rhizoidal branchlets (arrow) and basally constricted tenaculiferous branchlets in lower portions of the capitulum (SUVA (USP) 915). Scale bar = 100 µm. **Figs 56–59.** *Rhipilia penicilloides*. Variations in siphon dichotomies and constrictions (L 996. 175... 691) (see text). **Fig. 60.** *Rhipilia penicilloides*. Single siphon from the central region of the adult stipe, showing its large diameter and numerous lateral rhizoidal branchlets (SUVA (USP) 915). Scale bar = 200 µm. **Figs 61–63.** *Rhipilia penicilloides*. Variations in siphon dichotomies and constrictions (L 996. 175... 691) (see text).

Rhipilia tenaculosa A. et E.S.Gepp 1911: 56, figs 130–133 (type locality: Indonesia) (Figs 51 *a–d*, 70)

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 66.

Representative Material Examined

Fish Patch, Suva Harbour (*Keats*, 23.viii.1994: SUVA (USP) 786, 792).

Thallus thin and translucent when dry, light to dark green. Habit solitary; plant 4–6 × 1.5–4 cm with a stipe 8–12 × 1–1.5 mm. Frond flabellate and fissile, distinctly zoned with lacerate to fringed margins. Frond filaments 44–56 µm in diameter; dichotomous with constrictions above the dichotomies with cell-wall thickenings apparent at some constrictions. Sympodial tenacula abundant, mostly short (45–67 µm, only sometimes up to 110 µm long) and terminated by 3 or 4 prongs.

Habitat and Remarks

Found growing attached to *Acropora* coral pieces, at a 20–25-m depth in the lagoon.

Genus ***Rhipiliella*** Kraft 1986*a*: 65
Rhipiliella verticillata Kraft 1986*a*: 66, figs 41–54 (type locality: Great Barrier Reef, Qld) (Figs 75, 76)

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 66.

Representative Material Examined

Suva Barrier Reef (*Keats*, 8.x.1994: SUVA (USP) S11: 20).

Plants up to 10 mm high, composed of a cyathiform, subpeltate to oval blade 5–7 mm across, borne on a smooth monosiphonous stalk 3–5 mm × 89–115 µm. Blade monostromatic, composed of siphons 20–42 µm in diameter with unconstricted dichotomies and bluntly rounded tips. Siphons cohering by means of a series of alternating, distichous blunt–conical lateral proliferations 15–21 µm long in upper portions of blade. The slender stalk is possessed with verticillate rings of scars, indicating previous shedding of blade siphons. The latter feature is characteristic of this genus.

Habitat and Remarks

Growing on boulders, on the spur and groove zone of the outer reef, at a 5–10-m depth. The Fijian material was examined by Dr G. T. Kraft (*in lit*.) and represents the first record of this species outside of the type locality.

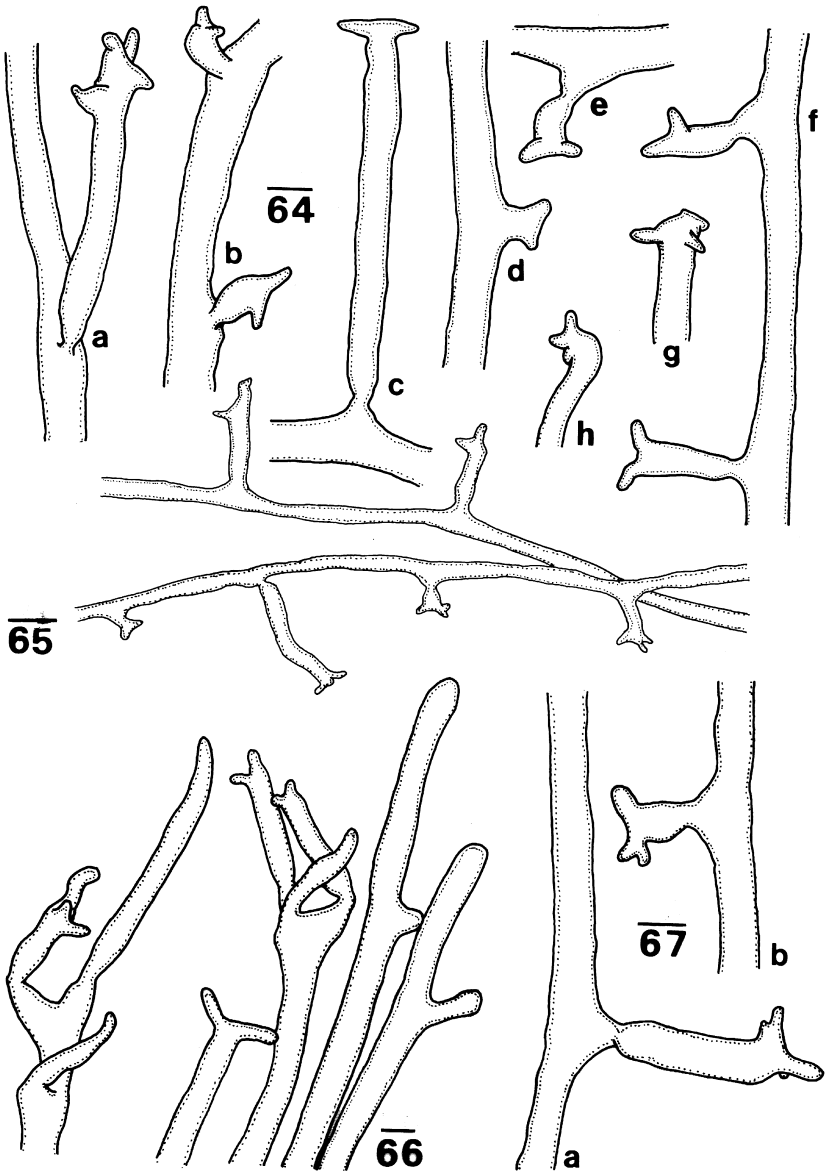
Genus ***Rhipiliopsis*** Gepp et Gepp 1911: 45
Rhipiliopsis howensis G.T.Kraft 1986*a*: 55, figs 22–30 (type locality: Lord Howe I.) (Fig. 77*a*, *b*)

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 65.

Representative Material Examined

Belcher Rocks (*Keats*, 27.xi. 1994: SUVA (USP) 856, S12: 2, S12: 3, S12: 5).



Figs 64, 65. *Rhipilia penicilloides*. Various kinds of lateral tenaculiferous branchlets on siphons (L 996. 175... 691). **Fig. 66.** *Rhipilia penicilloides*. Upper portion of the capitulum of juvenile thallus, showing abundant tenaculiferous branchlets on siphon apices (SUVA (USP) 918). Scale bar = 50 µm. **Fig. 67.** (*a*, *b*) *Rhipilia penicilloides*. Various kinds of lateral tenaculiferous branchlets on siphons (L 996. 175... 691). Scale bar = 50 µm.

Thallus consisting of a cuneate-flabellate blade 5–8 mm in diameter, borne atop a monosiphonous stalk about 1 × 5–6 mm provided with spinous outgrowths 8–10 µm in diameter. Blade composed of 3–15 layers of subparallel, regularly dichotomous filaments 50–60 µm in diameter, expanding to about 100 µm below the deeply constricted dichotomies. Siphon apices bluntly rounded; subapical lateral connections common between filaments.

Habitat and Remarks

On coral substratum, at a 15–20-m depth. The Fijian record is the first outside of the type locality (G. T. Kraft, pers. comm.).

Genus ***Tydemania*** Weber-van Bosse 1901: 139
Tydemania expeditionis Weber-van Bosse 1901: 139, 140 (syntype localities: various in Indonesia); A. and E. S. Gepp 1908: 174, pl. 23, figs 18, 19; 1911: 66, pl. XVIII, figs 153, 154; Taylor 1950: 73, pl. 38, fig. 1; Gilmartin 1966: 100–104, figs 3–6; Coppejans and Prud'homme van Reine 1989*a*: 135, pl. 8, figs 1–3; Verheij and Prud'homme van Reine 1993: 140, pl. 7, fig. 3; Coppejans *et al*. 1995*a*: 92, figs 33–36 (as ecad *gardineri*) (Figs 17, 18)

Fiji and Rotuma Records

Chapman 1977: 162; Kasahara 1985: 24; 1988; South 1991: 5; N'Yeurt *et al*. 1996*b*: 66.

Representative Material Examined

Fish Patch (Keats, 18.x.1994: SUVA (USP) 868).

Thallus flabelloid, up to 20 mm high, consisting of successive crops of lightly calcified monostromatic blades borne oppositely on a monosiphonous main axis 400–500 µm in diameter with basal stipites. Basal articuli of blades bead-like; blade siphons terete and regularly dichotomously branched, 123–135 µm in diameter; parallel and evenly constricted above dichotomies.

Habitat and Remarks

Growing in deep water (up to 42-m depth).

Order **Dasycladales** Pascher
Family **Dasycladaceae** Kützing 1843: 312 ('Dasycladeae')
Genus ***Neomeris*** Lamouroux 1816: 241

Neomeris vanbosseae Howe 1909: 80, pl. 1, figs 4,7; pl. 5, figs 17–19 ('*van bosseae*') (type locality: Sikka, Flores, Indonesia); Egerod 1952: 405, pl. 41, fig. 22*b*; Valet 1969: 596, pl. 146, figs 2, 5; pl. 153, figs 4–7, 10–12, 14; Coppejans *et al*. 1995*a*: 100, fig. 41

Fiji and Rotuma Records

Chapman 1971: 165; Kasahara 1985: 40, pl. 6, fig. 7; South 1991: 6; South and Kasahara 1992: 53; N'Yeurt 1996: 396, figs 58, 90; N'Yeurt *et al*. 1996*b*: 67.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 190).

Plants cylindrical, up to 20 × 4 mm, in a broad, 120–130° curve. Basal portion whitish and moderately calcified, upper portion light to dark green, with hairlike whorls of radial branchlets at the tip. Inner structure with persistent stalk cells 525–575 µm long, bearing paired deciduous cortical assimilatory cells, elongated below about 200 µm, truncate-capitate above; broadly conical to 125 µm in diameter and giving rise terminally to deciduous, segmented monomorphous hairs 0.5–1.0 mm long. Gametangia 75–100 µm in diameter, bearing a single spherical cyst at the end of a stalk cell between paired diamond-shaped assimilatory cells.

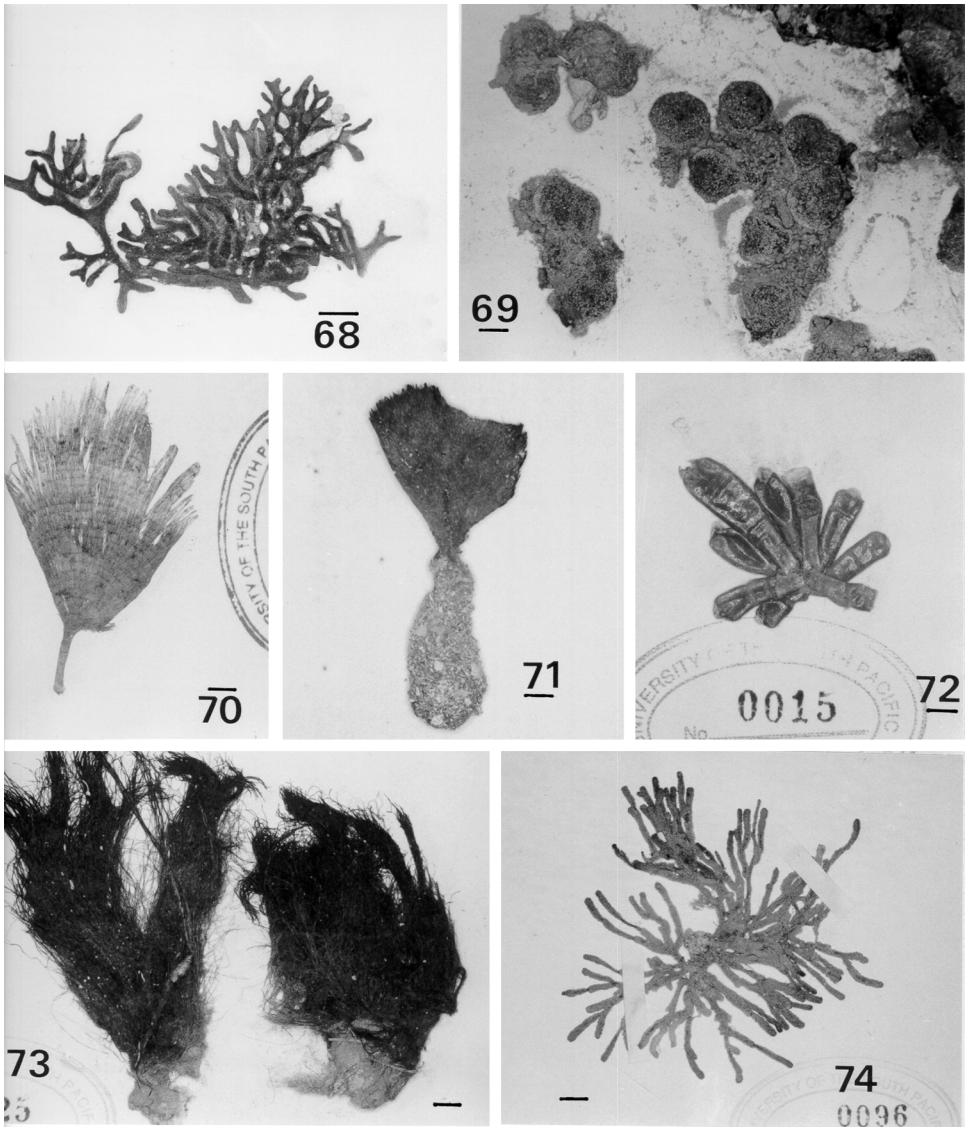


Fig. 68. *Codium geppiorum*. Habit (SUVA (USP) 098). Scale bar = 10 mm. **Fig. 69.** *Codium mamillosum*. Habit (SUVA (USP) 669). Scale bar = 5 mm. **Fig. 70.** *Rhipilia tenaculosa*. Habit (SUVA (USP) 786). Scale bar = 5 mm. **Fig. 71.** *Avrainvillea erecta*. Habit (SUVA (USP) 005). Scale bar = 5 mm. **Fig. 72.** *Bornetella nitida*. Habit (SUVA (USP) 015). Scale bar = 5 mm. **Fig. 73.** *Chlorodesmis fastigiata*. Habit (SUVA (USP) 025). Scale bar = 5 mm. **Fig. 74.** *Caulerpa webbiana*. Habit (SUVA (USP) 096). Scale bar = 5 mm.

Habitat and Remarks

Found growing in localised clumps, intertidally and in shallow waters up to 10-m depth.

Genus ***Bornetella*** Munier-Chalmas 1877: 816
Bornetella nitida Sonder 1880: 39 (type locality: Tonga); Coppejans and Prud'homme van Reine 1989*b*: 125, figs 22–26; 1992*a*: 178 (Figs 14 *a*, *b*, 72)

Fiji and Rotuma Records

Chapman 1971: 165; Kasahara 1985: 38, pl. 6, fig. 4; N'Yeurt *et al*. 1996*b*: 66.

Representative Material Examined

Makaluva I. (Keats, 26.vii.1994: SUVA (USP) 1140); Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 015).

Thallus olive-green and glabrous, clavate and curved, 3–8 × 25–35 mm, composed of a central erect axis and whorls of divided lateral branches along the entire length. Stipe about 7 × 1 mm. Primary branches producing distally 3–8 secondary branches, with inflated apices that adhere laterally to form a monostromatic calcified cortex of hexagonal units 392–430 µm in diameter. Only one lateral gametangium 380–400 µm in diameter per primary branch, containing 20–35 cysts about 50 µm in diameter.

Habitat and Remarks

Growing on the reef flat, intertidally.

Family **Polyphysaceae** Kützing
Genus ***Polyphysa*** Lamarck 1816: 151

Polyphysa parvula (Solms-Laubach) Schnetter et Bula-Meyer 1982: 42, pl. 7, figs *c–f* (type locality: Celebes, Indonesia)

Basionym and Nomenclatural Synonymy

Acetabularia parvula Solms-Laubach 1895: 29, pl. 2, figs 3, 5 (syntype localities: 'Tropical India'; Macassar; Celebes; Indonesia); Valet 1969: 621, pl. 11, figs 1–7; pl. 12, fig. 7; pl. 19, figs 2–4; pl. 20, figs 5–8; pl. 22, figs 1, 4, 7; pl. 29; pl. 38 figs 1, 4, 5; pl. 45, figs 5–7.

Fiji and Rotuma Records

Garbary *et al*. 1991: 252 (as *Acetabularia moebii* Solms-Laubach); South *et al*. 1993: 184 (as *Acetabularia parvula*); N'Yeurt 1996: 396, fig. 89; N'Yeurt *et al*. 1996*b*: 66.

Representative Material Examined

Makaluva I. (*Keats*, 8.xi.1994: SUVA (USP) S11: 13).

Plants up to 6 mm high, with a monoplanar reproductive disc 2.5–3 mm in diameter borne atop a slender stalk. Disc composed of 14 cylindrically clavate segments with rounded apices, the segments loosely joined together by light calcification. Corona superior present, corona inferior lacking.

Habitat and Remarks

Growing in clusters, attached to rocks or coral substratum from subtidal and intertidal habitats.

Division **Phaeophyta** Pascher
Class **Phaeophyceae**
Order **Ectocarpales** Setchell & Gardner
Family **Ectocarpaceae** Setchell & Gardner emend. Pedersen 1984: 50
Genus ***Hincksia*** J.E.Gray 1864

Key to the Suva Lagoon and Reef Species of *Hincksia*

1. Thallus with hooked secondary branchlets ..... *H. breviarticulata*
   Thallus without hooked secondary branchlets ..... *H. mitchelliae*

Hincksia breviarticulata (J.Agardh) P.C.Silva in Silva *et al*. 1987: 73

Basionym and Nomenclatural Synonymy (fide *Silva* et al. *1987*)
Ectocarpus breviarticulatus J.Agardh 1847: 7 (type locality: 'St Augustin' (Oaxaca, Mexico)); Dawson 1954: 398, fig. 14*a*, *b*.

Fiji and Rotuma Records

South *et al*. 1993: 184; N'Yeurt 1996: 397, figs 95, 98*a–e*; N'Yeurt *et al*. 1996*b*: 67.

Representative Material Examined

Laucala Bay (*Lam*, 22.ix.1992: SUVA (USP) S7: 18).

Plants yellow-brown, tufted, 20–35 mm high, with irregular primary branching and numerous hooked secondary branchlets that hold the filaments in rope-like spongy strands. Filaments about 25 µm thick, composed of rectangular cells about up to 25 × 50 µm. Secondary hook-like branchlets up to 800 × 25 µm, arising at 85–90° to main filaments and spaced at 500–700-µm intervals. Plurilocular sporangia 40–45 µm high, short and pyriform, containing about 8 spores and borne on a stalk cell.

Habitat and Remarks

Found growing on shells, rocks and other substratum in the lagoon.

Hincksia mitchelliae (Harvey) P.C.Silva in Silva *et al*. 1987: 73 (Figs 79, 84)

Basionym

Ectocarpus mitchelliae Harvey 1852: 142, pl. 12g (*mitchellae*) (type locality: Nantucket, Massachusetts, USA; type in TCD); Dawson 1954: 400, fig. 14*c*, *d*.

Fiji and Rotuma Records

Dravuni Island, Kadavu (South 1991: 6; omitted in South and Kasahara 1992 and South *et al*. 1993); N'Yeurt *et al*. 1996*b*: 67.

Representative Material Examined

Makaluva I. (*Keats*, 11.viii.1994: SUVA (USP) S11: 11, S11: 12).

Thallus light brown, densely tufted and up to 10 mm high. Branching profuse; filaments tapering towards the apex. Main axis 20–22 µm in diameter, with terminal branches 9–16 µm in diameter. Cell length-to-breadth ratio 1–2. Plurilocular sporangia cylindrical, up to 61 × 20 µm; sessile and adaxial with rounded ends.

Distribution

Vietnam, Marshall Is, Bikini Atoll, Jamaica, Tanzania, Australia, Norfolk I., French Polynesia, Philippines, Taiwan, Hawai'i, Fiji.

Habitat and Remarks

Epiphytic on Sargassum sp., at 3–5-m depth.

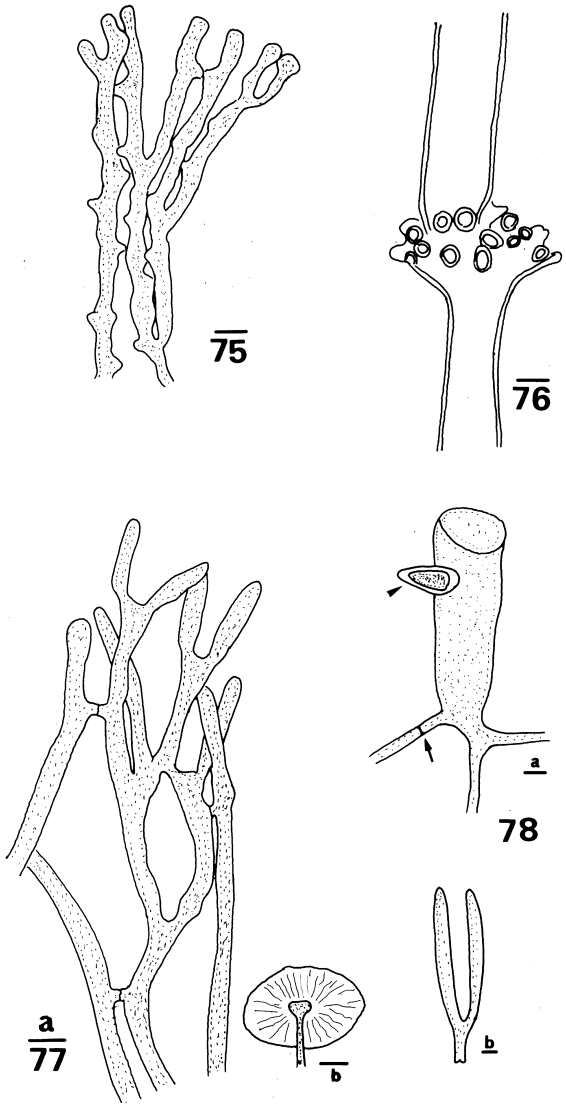


Fig. 75. *Rhipiliella verticillata*. Blade margin showing laterally attached siphons (SUVA (USP) S11: 20). Scale bar = 50 µm. **Fig. 76.** *Rhipiliella verticillata*. Slender stalk with verticillate rings of scars (SUVA (USP) S11: 20). Scale bar = 50 µm. **Fig. 77.** (*a*) *Rhipiliopsis howensis*. Detail of blade siphons in thallus margin (SUVA (USP) S12: 2). Scale bar = 100 µm. (*b*) Habit (SUVA (USP) S12: 2). Scale bar = 2 mm. **Fig. 78.** (*a*) *Codium extricatum*. Utricle with lateral gametangium (arrowhead) and medullary filament plug (arrow) (SUVA (USP) S14: 12). Scale bar = 100 µm. (*b*) Habit, showing stipe and dichotomous branching. Scale bar = 4 mm.

Order **Cutleriales** Oltmanns
Family **Cutleriaceae** Hauck
Genus ***Cutleria*** Greville 1830: 59, pl. 10

Cutleria sp. (Sporophyte or 'Aglaozonia stage') (Fig. 99)

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 67.

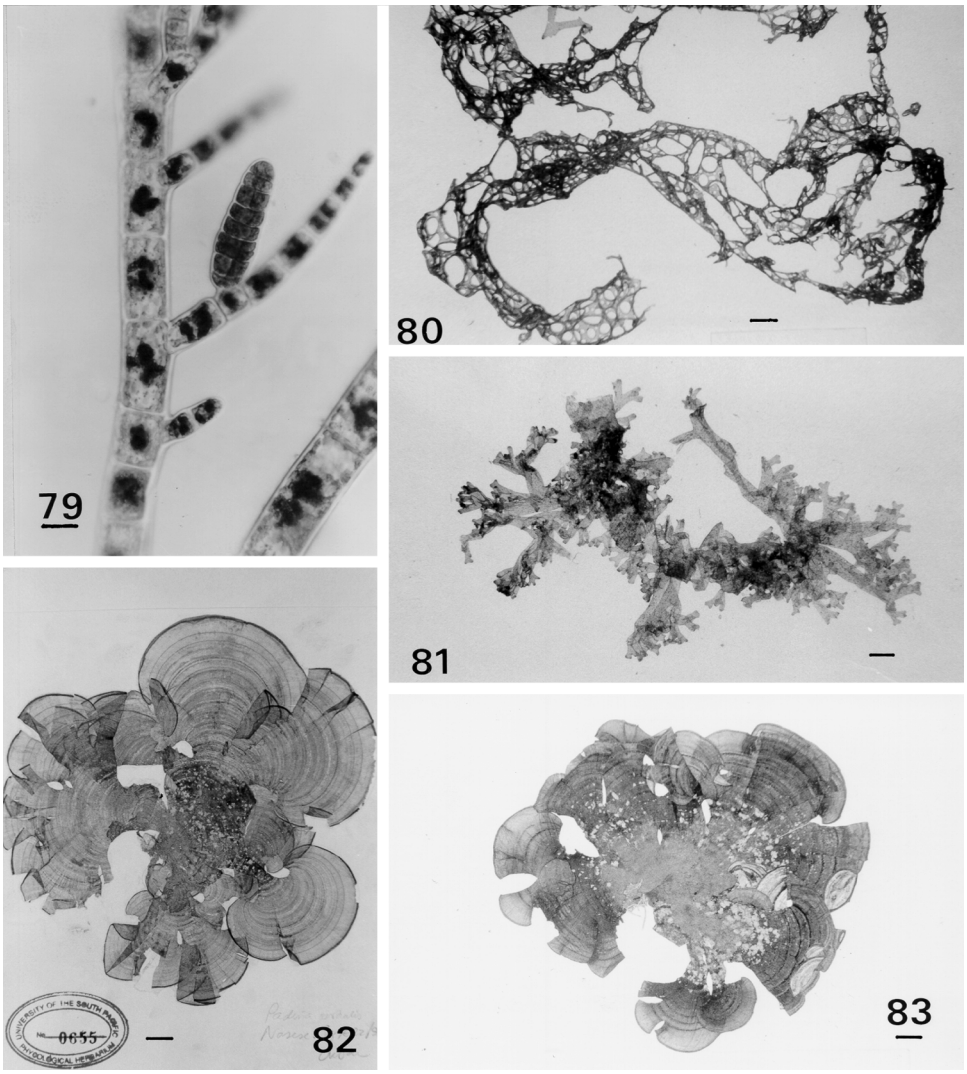


Fig. 79. *Hincksia mitchelliae*. Habit showing plurilocular sporangia (SUVA (USP) S11: 11). Scale bar = 20 µm. **Fig. 80.** *Hydroclathrus clathratus*. Habit (SUVA (USP) 1170). Scale bar = 5 mm. **Fig. 81.** *Rosenvingea intricata*. Habit (SUVA (USP) 1158). Scale bar = 5 mm. **Fig. 82.** *Padina australis*. Habit (SUVA (USP) 655). Scale bar = 10 mm. **Fig. 83.** *Padina pavonica*. Habit (SUVA (USP) 1146). Scale bar = 5 mm.

Representative Material Examined

Laucala Bay (*South*, 7.ii.1993: SUVA (USP) S8: 11).

Thallus encrusting, prostrate and dorsiventral, consisting of dark brown monostromatic fan-shaped blades 5–6 mm wide, attached to the substratum via ventral multicellular rhizoids 1–1.5 mm long. Marginal cells deeply pigmented, subquadrate to rectangular, 36–53 × 27–30 µm; cells in middle portions of thallus subrectangular, 10–26 × 10–13 µm. Material sterile.

Habitat and Remarks

Growing as a crust on rocks in the lower intertidal. It is possible that the sexual thalli of this mostly temperate species mature in the cooler months (July–August).

Order **Scytosiphonales** J.Feldmann 1949
Family **Chnoosporaceae** Setchell & Gardner 1925: 400, 552
Genus ***Chnoospora*** J.Agardh 1847

Chnoospora implexa J.Agardh 1848: 172 (type locality: near Tor, Sinai Peninsula, Egypt); Dawson 1954: 404, fig. 20*a*, *b*) (Figs 87, 88)

Fiji and Rotuma Records

N'Yeurt *et al*. 1996*b*: 69.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 22.ix.Sep. 1985: SUVA (USP) 679); Laucala Bay (*Carlson*, 10.x.1972: SUVA (USP) 145); Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 678; *Faloon*, 22.x.1993: SUVA (USP) 667, 746).

Plants up to 6 cm across, wiry, terete to compressed, forming extensive compact to lax yellow-brown unattached masses, up to 15 cm in diameter. Branching divaricately dichotomous, with branches 0.5–1 mm in diameter. Forking distant below and becoming denser above (up to the sixth order), axes slightly broadened at dichotomies. In cross-section, subterete to oval, with a medulla of irregularly ovoid to subrectangular cells 42–100 µm in diameter, with a central region of small circular cells with thickened cell walls. Cortical cells decreasing in size outwards; the outermost regularly oval to rectangular, 15–16 µm high; subcortical cells 1- or 2-layered, oval to cuboidal, 25–50 µm in diameter.

Habitat and Remarks

Found growing entangled with Sargassum sp., at a depth of 5–10 m in the lagoon near Makaluva Island. This seasonal species seems to be present mostly in September–October, after the cool season and at the onset of the warmer season. Similar patterns are seen in French Polynesia (A. D. R. N'Yeurt, pers. obs.). *Chnoospora implexa* favours calm, lagoonal conditions, unlike the related species *Chnoospora minima* (Hering) Papenfuss, which is found in exposed habitats in Rotuma Island (N'Yeurt 1996), Solomon Islands (Womersley and Bailey 1970), Hawai'i (Abbott 1989), the Cook Islands (N'Yeurt 1998, p. 38) and Tahiti (Payri and N'Yeurt 1997). However in New Zealand (Nelson and Duffy 1991), *C. minima* is an introduced alga occuring in sheltered localities.

Family **Scytosiphonaceae** Farlow
Genus ***Colpomenia*** (Endlicher) Derbès et Solier in Castagne 1851: 95

Colpomenia sinuosa (Mertens ex Roth) Derbès et Solier in Castagne 1851: 95; Dawson 1954: 402, Figs 18*a*, *c*, *d*; Womersley 1987: 297, figs 107*A*, 108*E*, *F*; Coppejans *et al.* 1995*b*: 177 (Figs 85, 86, 96)

Basionym and Nomenclatural Synonymy

Ulva sinuosa Mertens ex. Roth 1806: 327, pl. XI (type locality: near Cádiz, Spain; type and Roth's herbarium destroyed in bombing of Berlin–Dahlem during World War II).

Fiji and Rotuma Records

Chapman 1971: 166; N'Yeurt *et al*. 1996*b*: 69.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 246); Suva Point (*South*, 18.xi. 1990: SUVA (USP) 626).

Thallus yellow to golden-brown, epilithic or epiphytic, 1–10 cm in diameter; sessile and hollow, of irregularly globular or convoluted shape. Thallus consisting of a surface layer of pigmented cuboidal cells 5.5–6 µm across and 4–6 layers of progressively larger subcortical and clear medullary cells 50–215 µm in diameter. Hairs 31–43 µm long with basal meristems commonly occurring in scattered pits. Specimens sterile.

Habitat and Remarks

Common on the intertidal flats of Laucala Bay and Suva Point and also on the barrier reef, either attached to rocks or epiphytic on seagrasses, or other algae (e.g. *Turbinaria* stalks).

All specimens examined were sterile, but the vegetative characters (especially the thickness of the thallus) most closely approach *C. sinuosa*. It is of interest that Womersley and Bailey (1970, p. 293) reported *C. peregrina* (Sauvageau) Hamel as the only species from the nearby Solomon Islands, noting its thin thallus with only 3 rows of inner cells, in contrast with the Fijian plants having at least 4–6 rows or medullary cells. Definite identification of the Suva material must await discovery of fertile thalli.

Genus ***Hydroclathrus*** Bory de Saint-Vincent 1825: 419
Hydroclathrus clathratus (C.Agardh) Howe 1920: 590; Womersley 1987: 300, figs 109*A*; Verheij and Prud'homme van Reine 1993: 163, pl. 13, fig. 2; Coppejans *et al*. 1995*b*: 178, fig. 1 (Fig. 80)

Basionym and Nomenclatural Synonymy

Encoelium clathratum C. Agardh 1823 (1822–1823): 412 (type locality uncertain).

Fiji and Rotuma Records

Grunow 1874: 24 (as *Asperococcus clathratus*); Chapman 1971: 166; N'Yeurt *et al*. 1996*b*: 69.

Representative Material Examined

Makaluva I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 274); Nasese (*South*, 22.ix.1991: SUVA (USP) 604); Nukulau I. (*South*, 9.ix.1991: SUVA (USP) 433a; 19.xii.1992: SUVA (USP) 431); Toberua Pass (*N'Yeurt*, 18.viii.1997: SUVA (USP) 1170).

Thallus dark brown, consisting of an expanded, torn and irregularly lobed clathrate membrane with abundant ovoid to spherical holes 3–11 mm in diameter. Attachment vague and diffuse, by means of rhizoids. Medulla 3–5-layered, of large clear cells 90–135 µm in diameter and cortex 1 or 2 cells thick, of isodiametric pigmented cells 6–10 µm in diameter. Reproduction not seen.

Habitat and Remarks

Growing in spreading masses on the intertidal reef flat and tide pools, with other brown and green algae.

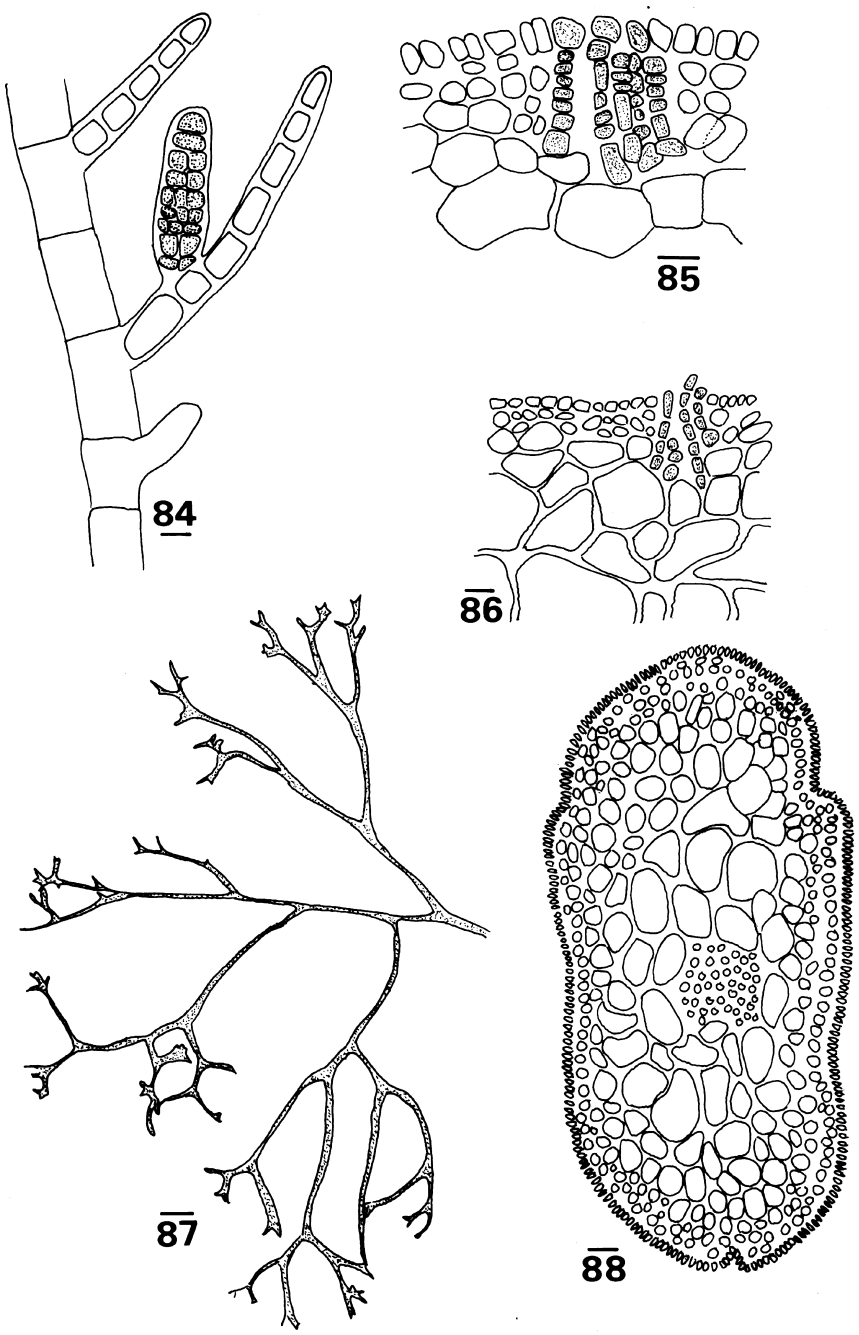


Fig. 84. *Hincksia mitchelliae*. Habit showing plurilocular sporangia (SUVA (USP) S11: 11). Scale bar = 10 µm. **Fig. 85.** *Colpomenia sinuosa*. Cross-section of thallus showing hair pit (SUVA (USP) 246). Scale bar = 10 µm. **Fig. 86.** *Colpomenia sinuosa*. Cross-section of thallus showing hair pit and medulla (SUVA (USP) 246). Scale bar = 20 µm. **Fig. 87.** *Chnoospora implexa*. Habit (SUVA (USP) 667). Scale bar = 4 mm. **Fig. 88.** *Chnoospora implexa*. Cross-section of thallus (SUVA (USP) 667). Scale bar = 50 µm.

Genus ***Rosenvingea*** Børgesen 1914: 22

Key to the Suva Lagoon and Reef Species of *Rosenvingea*

1. Thallus forming cushions; branching irregularly dichotomous at wide angles . . . . . *R. intricata*
   Thallus solitary and erect; branching regularly dichotomous to subdichotomous . . . . . *R. orientalis*

Rosenvingea intricata (J.Agardh) Børgesen 1914: 26; Dawson 1957: 111, fig. 1 (Figs 81, 94, 95)

Basionym and Nomenclatural Synonymy

Asperococcus intricatus J.Agardh 1847: 7 (type locality: Veracruz, Mexico).

Fiji and Rotuma Records

N'Yeurt 1997: 134.

Representative Material Examined

Toberua Pass, Kaba (*N'Yeurt*, 18.viii.1997: SUVA (USP) 1158, S15: 2).

Thallus with hollow branches 2–5 mm in diameter, forming golden brown entangled cushions 3–10 cm in diameter. Branching irregular to irregularly dichotomous, at wide angles, with tapered subacute to truncated apices. Medulla of large, irregularly shaped clear cells 22–71 µm in diameter. Cortex 1–layered, composed of subrectangular to squarish pigmented cells 7–11 × 8–15 µm. Sporangia not seen.

Habitat and Remarks

Growing on the reef flat, together with *Padina* sp. and other brown and green algae. This common alga may be seasonal (as is the case in French Polynesia, A. D. R. N'Yeurt, pers. obs.) and this could explain why it was overlooked in the past.

Rosenvingea orientalis (J.Agardh) Børgesen 1914: 26; Verheij and Prud'homme van Reine 1993: 163, pl. 13, fig. 3

Basionym and Nomenclatural Synonymy

Asperococcus orientalis J.Agardh 1848: 78 (type locality: Manila, Luzon, Philippines); Weber-van Bosse 1913: 137.

Fiji and Rotuma Records

South *et al*. 1993: 185, fig. 4*a–c*; N'Yeurt *et al*. 1996*b*: 69.

Representative Material Examined

Nukulau I., Suva (*South*, 9.ix.1991: SUVA (USP) 232).

Plants to 18 cm tall, branching frequent, dichotomous to subdichotomous, terminating in fine, sharply attenuated tips. Thallus hollow, with numerous phaeophycean hairs and a 1- or 2-layered cortex of isodiametric to angular cells, with a single-layered epidermis. Fertile plants not found.

Habitat and Remarks

Found in a silty channel between Nukulau and Makaluva Island, just below low tide level and attached by small discoid holdfasts to fragments of dead *Acropora* coral.

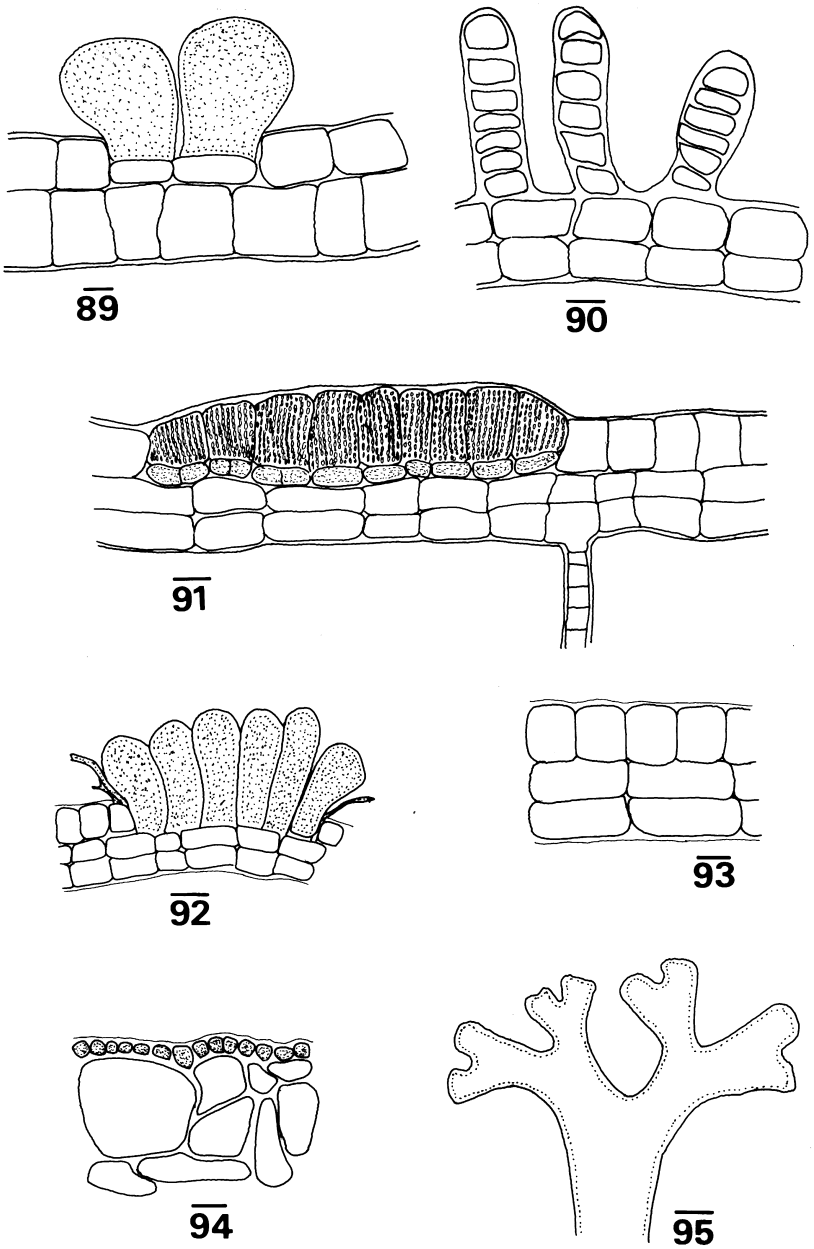


Fig. 89. *Padina australis*. Cross-section of thallus showing non-indusiate sporangia (SUVA (USP) 655). Scale bar = 20 µm. **Fig. 90.** *Padina australis*. Cross-section of thallus (SUVA (USP) 655). Scale bar = 10 µm. **Fig. 91.** *Padina pavonica*. Cross-section of thallus showing indusiate sporangia (SUVA (USP) S13: 18). Scale bar = 20 µm. **Fig. 92.** *Padina pavonica*. Detail of mature indusiate sporangia (SUVA (USP) S13: 18). Scale bar = 35 µm. **Fig. 93.** *Padina pavonica*. Cross-section of thallus. Note subquadrate outermost cells (SUVA (USP) S13: 18). Scale bar = 20 µm. **Fig. 94.** *Rosenvingea intricata*. Cross-section of thallus (SUVA (USP) S15: 2). Scale bar = 20 µm. **Fig. 95.** *Rosenvingea intricata*. Habit of ultimate branchlet (SUVA (USP) S15: 2). Scale bar = 5 mm.

Order **Dictyotales** Kjellman
Family **Dictyotaceae** Lamouroux ex Dumortier
Genus ***Dictyopteris*** Lamouroux 1809: 332, *nomen conservandum*

Dictyopteris delicatula Lamouroux 1809: 332, pl. 6, fig. 2*B* (type locality: Antilles, West Indies); Allender and Kraft 1983: 107, fig. 19*C*, *D* (Figs 97, 98, 100)

Fiji and Rotuma Records

N'Yeurt 1997: 136.

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 27.xi.1994: SUVA (USP) 1157; S14: 6).

Plants procumbent, to 25 × 1–2.5 mm, dichotomously branched and attached by marginal rhizoids. Thallus 91–178 µm in diameter (178 µm in central portion), with a central midrib about 63 µm wide and submarginal ridges about 45 µm wide. Blade 4–7 cells thick at midrib and 4 cells thick at submarginal ridges; distromatic in other portions. Ridges and midrib resulting from indurate veins of thick-walled cells 18–20 µm in diameter. Cells of thallus squarish to subrectangular or ovate, 22–70 × 42–57 × 34–43 µm. Sporangia in scattered sori on blade surfaces.

Habitat and Remarks

Growing on *Gracilaria vieillardii*, at 15–20-m depth. This species can be readily distinguished by its thickened margins and prominent midrib.

It has been suggested (Allender and Kraft 1983, p. 108) that *D. delicatula* and *D. repens* (Okamura) Børgesen are variants of the same entity, since they often occur in the same locality. The Fijian material, however, is in good agreement with *D. delicatula*, only plants with submarginal ribs have been found. On the other hand, *D. repens* (lacking a submarginal rib) occurs in Rotuma (N'Yeurt 1996) and French Polynesia (Payri and N'Yeurt 1997), but *D. delicatula* has to date not been found in these localities. Littler and Littler (1997, p. 73, fig. 90; 2000, p. 254) report *D. delicatula* from Belise and the Caribbean, but their illustrations and description do not show or mention thickened margins. Detailed culture studies under various controlled conditions are needed to clarify the status of these two species.

Genus ***Dictyota*** Lamouroux 1809: 331, *nomen conservandum*
Dictyota friabilis Setchell 1926: 91, pl. 13, figs 4–7, pl. 20, fig. 1 (type locality: Tafaa Point, Tahiti); Dawson 1954: 401, fig. 16*a*, *b*

Fiji and Rotuma Records

Ajisaka and Enomoto 1985: 37, figs 1, 5; South and Kasahara 1992: 54; N'Yeurt 1996: 400, figs 93, 94, 100, 101; N'Yeurt *et al*. 1996*b*: 68.

Representative Material Examined

Fish Patch (*Keats*, 12.v.1995: SUVA (USP) S9: 18).

Thallus imbricating, prostrate and friable, flat and membranous; individual fronds spreading to 3 cm in diameter. Colour yellowish brown, with irregular dichotomous branching and entire margins, contiguous segments mutually attached by bundles of

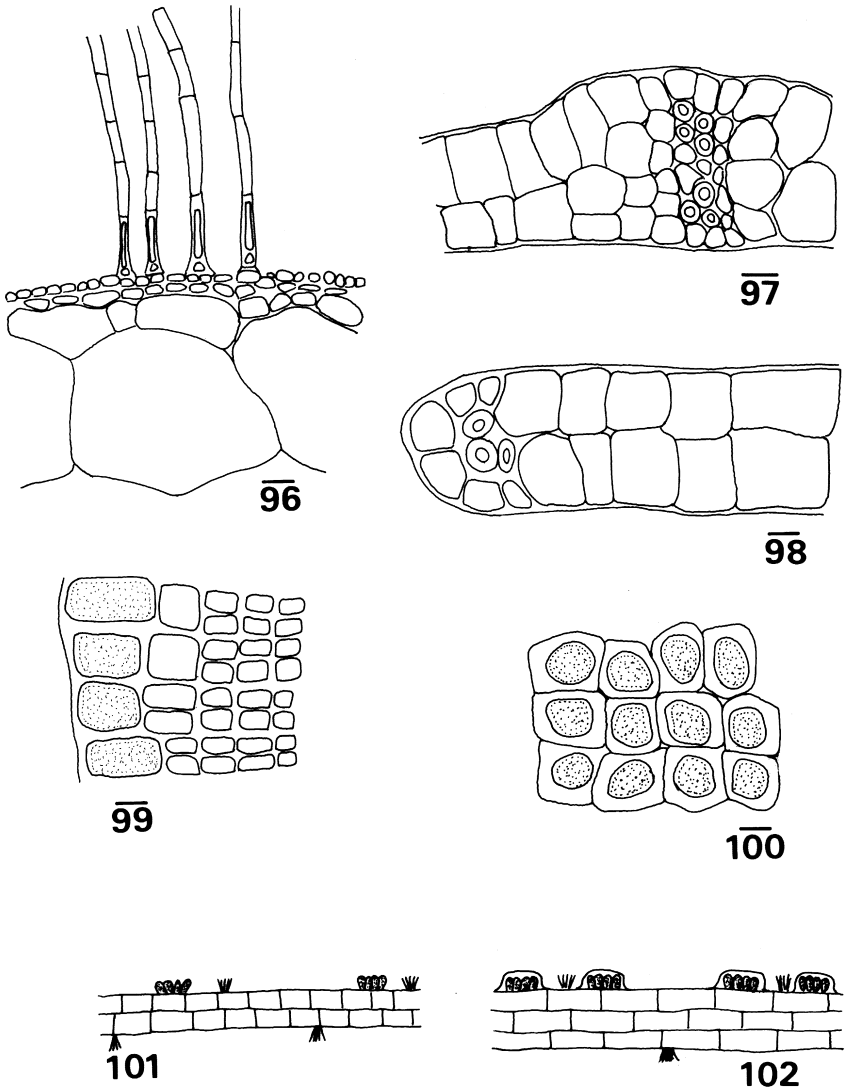


Fig. 96. *Colpomenia sinuosa*. Cross-section of thallus showing phaeophycean hairs (SUVA (USP) 246). Scale bar = 20 µm. **Fig. 97.** *Dictyopteris delicatula*. Cross-section of thallus showing thickened midrib (SUVA (USP) S14: 6). Scale bar = 35 µm. **Fig. 98.** *Dictyopteris delicatula*. Cross section of thallus showing thickened margin (SUVA (USP) S14: 6). Scale bar = 20 µm. **Fig. 99.** *Cutleria* sp. Thallus margin of sporophyte generation (SUVA (USP) S8: 11). Scale bar = 20 µm. **Fig. 100.** *Dictyopteris delicatula*. Surface of thallus (SUVA (USP) S14: 6). Scale bar = 20 µm. **Fig. 101.** *Padina australis*. Schematic diagram showing non-indusiate sporangia in rows distal to each hair band (SUVA (USP) 655). Not to scale. **Fig. 102.** *Padina pavonica*. Schematic diagram showing indusiate sporangia on either side of each hair band (SUVA (USP) 1146). Not to scale.

rhizoids. Apices rounded, with prominent paired apical cells. Angle of branching about 45–100°; segments up to 5 mm broad, tapering at base. Thallus tristromatic, about 125 µm thick with epidermal cells 25 µm tall and medullary cells 75 µm tall with lenticular thickenings. Sporangia 55–60 µm in diameter, scattered along middle portion of both surfaces of thallus.

Habitat and Remarks

Found intertidally and in shallow waters, often closely adhering to the substratum.

Genus ***Padina*** Adanson 1763: 13, 586, *nomen conservandum*

Key to the Suva Lagoon and Reef Species of *Padina*

1. Blade orange brown, two cells thick throughout, sporangia non-indusiate . . . . . *P. australis*
   Blade dark brown, three to four cells thick, sporangia indusiate . . . . . *P. pavonica*

Padina australis Hauck 1887 (1886–1889): 44 (type locality: Cape York, Qld, Australia); Dawson 1957: 110, fig. 14*a*; Allender and Kraft 1983: 85, fig. 6*B*, Verheij and Prud'homme van Reine 1993: 428, fig. 5*c*, pl. 10, figs 3–6; Coppejans *et al*. 1995*b*: 184, fig. 22 (Figs 82, 89, 90, 101)

Fiji and Rotuma Records

Garbary *et al*. 1991: 253; South 1991: 6; N'Yeurt *et al*. 1996*b*: 68.

Representative Material Examined

Fish Patch (*Keats*, 18.x.1994: SUVA (USP) 830); Nasese (*South*, 22.ix.1991: SUVA (USP) 655); Nukulau I. (*South*, 19.xii.1990: SUVA (USP) 656; 9.ix.1991: SUVA (USP) 681); Suva Barrier Reef (*Carlson*, 19.x.1972: SUVA (USP) 214; *Kasahara*, 24.ix.1985: SUVA (USP) 218; *South*, 5.v.1993: SUVA (USP) 644).

Fronds orange-brown, lightly calcified and broadly flabellate. Blade 75–82 µm thick, distromatic throughout the thallus, with outer surface cells 35–47 × 34–36 µm and inner cells 36–50 × 41–46 µm. Sporangia non-indusiate, with spores 78–86 × 71–74 µm, in rows distal to each hair line on outer surface of frond; hair lines alternate on upper and lower surfaces.

Habitat and Remarks

Growing on the reef flat and in deeper waters. This species is distinguishable in the field by its orange coloured and thin thallus.

Padina pavonica (Linnaeus) Thivy in W.R.Taylor 1960: 234, 235 (Figs 83, 91–93, 102)

Basionym and Nomenclatural Synonymy

Fucus pavonicus Linnaeus 1753: 1162 (type locality: 'In Mari Europae australis').

Fiji and Rotuma Records

Grunow 1874: 25; Chapman 1971: 167; N'Yeurt *et al*. 1996*b*: 69.

Representative Material Examined

Makaluva I. (*Kasahara*, 11.ix.1985: SUVA (USP) 719, 720, 721, 722; 17.x.1985: SUVA (USP) 229; *N'Yeurt*, 11.viii.1997: SUVA (USP) 1146, S13: 18).

Fronds dark brown, 76–82 µm thick, tristromatic but sometimes tetrastromatic in basal portions; lightly calcified. Outer cells subcubical, 30–32 × 34–36 µm, smaller than cells of 2 lower layers, which are rectangular and measure 62–69 × 21–23 µm. Sporangia indusiate, on either side of hair bands; hair bands alternate on upper and lower surface of thallus.

Habitat and Remarks

Growing intertidally on the reef flat at Makaluva Island, attached to coral substratum. This species can be readily distinguished in the field by its small stature and dark brown colour.

Order **Fucales** Kylin
Family **Sargassaceae** Kützing
Genus ***Sargassum*** C.Agardh 1820: 1, *nomen conservandum*

Sargassum polycystum C.Agardh 1824: 304 (type locality: Sunda Strait, Indonesia); Dawson 1954: 406, fig 22*t*, *u*

Fiji and Rotuma Records

Chapman 1971: 167; Garbary *et al*. 1991: 253; South and Kasahara 1992: 55; N'Yeurt 1996: 403, figs 97, 108*a–c*; N'Yeurt *et al*. 1996*b*: 70.

Representative Material Examined

Nukulau I. (*Nicholson*, 26.vii.1978: BISH 512635).

Thallus up to 20 cm tall, colour yellow-brown to dark brown, attached to substratum by a black, spongy discoid holdfast 6–8 mm in diameter. Main axis 0.5–1.0 mm in diameter, with distinctive short, Y-shaped proliferations up to 1 mm long abundant throughout the plant. Leaves thin, lanceolate with coarsely serrated margins, 10–15 × 2–3.5 mm, with acute apex, tapering base and distinct midrib. Cryptostomata randomly distributed. Pedunculate vesicles spherical, 2–3 mm in diameter and sometimes tipped with spinose extensions, typically arising solitarily from the base of leaves and borne on a stalk 2.5–3 mm long. Receptacles not seen.

Habitat and Remarks

Growing in the channel, Nukulau Island.

Genus ***Turbinaria*** Lamouroux 1825: 71.
Turbinaria ornata (Turner) J.Agardh 1848: 266; Dawson 1954: 405; fig. 21; Verheij and Prud'homme van Reine 1993: 162, pl. 12, fig. 7; Coppejans *et al*. 1995*b*: 192, fig. 38

Basionym and Nomenclatural Synonymy

Fucus turbinatus Linnaeus var. *ornata* Turner 1807–1808: 50–53, pl. 24, figs *c*, *d* (type locality unknown).

Fiji and Rotuma Records

Chapman 1971: 167; South 1991: 7; South and Kasahara 1992: 55; N'Yeurt 1996: 405; N'Yeurt *et al*. 1996*b*: 70.

Representative Material Examined

Suva Point (*South*, 7.vii.1990: SUVA (USP) 242; 6.v.1993: SUVA (USP) 625).

Plants coarse and firm, up to 3–10 × 5.5 cm. Leaves 1–2 cm in diameter, with intramarginal teeth up to 3 mm high. Colour light brown to yellow, robust and attached to substratum by stilt-like haptera up to 2 × 25 mm. Up to 18 leaves per plant; stems moderately branched. Leaves generally concave; coarse and firm, with terete stalks for about half their length, terminally distended in a rounded to obpyramidal manner with obtuse ridges; a large vesicle usually occupying the central portion. Up to 13 marginal

crown teeth on periphery of leaves and up to 6 often paired, erect teeth arranged at about 120° angle over the peripheral surface of the blades.

Habitat and Remarks

Commonly found growing on the reef crest. Some of the Fijian plants are stocky and no more than 4 cm high, showing the environmentally induced form of dwarfism in exposed habitats, described by Payri (1984). In calmer lagoonal habitats, this species has a more lax and less robust habit, individual axes reaching up to 15 cm and at times once or twice dichotomously divided near the base, as also reported in French Polynesia (V. Stiger, pers. comm.).

Division **Rhodophyta** Wettstein 1901: 46
Class **Bangiophyceae** Wettstein 1901: 187
Order **Compsopogonales** Skuja 1939: 34
Family **Erythrotrichiaceae** Smith 1933: 120, 122
Genus ***Erythrotrichia*** J.E.Areschoug 1850

Erythrotrichia carnea (Dillwyn) J.Agardh 1883: 15, pl. *I*, figs 8–10; Dawson 1957: 111, fig. 16*c*; Womersley 1994: 28, fig. 2*A–D*; Abbott 1999*a*: 45, fig. 1*E* (Fig. 106)

Basionym and Nomenclatural Synonymy

Conferva carnea Dillwyn 1805: 54, pl. 84 (type locality: Glamorganshire, Wales).

Fiji and Rotuma Records

Garbary *et al*. 1991: 254; South 1991: 7; South and Kasahara 1992: 55; N'Yeurt 1996: 406, figs 109, 118; N'Yeurt *et al*. 1996*b*: 70.

Representative Material Examined

Fish Patch, Suva Barrier Reef (*Brooks*, 21.iii.1995: SUVA (USP) S13: 8).

Plants composed of erect, terete and simple filaments 400–428 × 12–14 µm, tapering towards the base and attached via a lobed basal cell. Median cells of axes 1–20 × 11–14 µm, about 1.5–2 times as long as broad, with axial chromatophores and a single central pyrenoid; apical cell rounded. Collections sterile.

Habitat and Remarks

Epiphytic on *Ptilothamnion schmitzii* Heydrich, in turn epiphytic on *Cladophora* sp., at 40-m depth on outer reef slope.

Class **Florideophyceae** Cronquist 1960: 438
Order **Acrochaetiales** Feldmann 1953: 12
Family **Acrochaetiaceae** Fritsch ex Taylor 1957: 209, 210, *nomen conservandum*
Genus ***Audouinella*** Børy 1823: 340

Audouinella saviana (Meneghini) Woelkerling 1973: 560, figs 56–60

Fiji and Rotuma Records

South *et al*. 1993: 186; N'Yeurt *et al*. 1996*b*: 71.

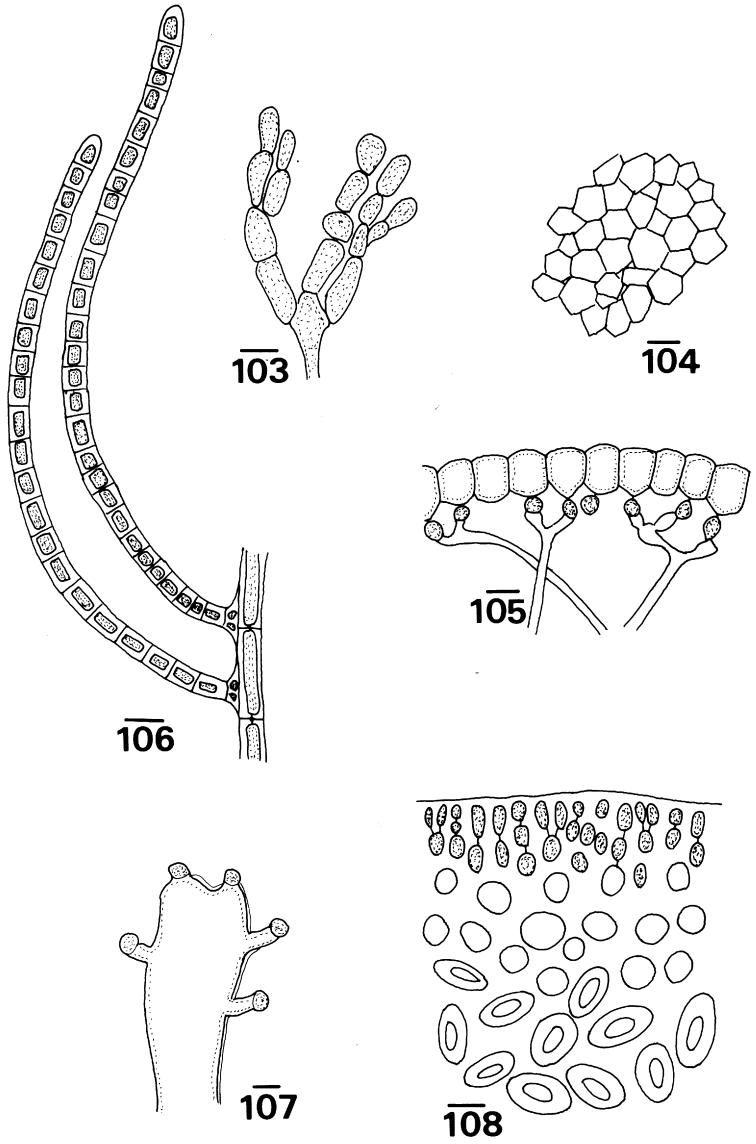


Fig. 103. *Ganonema farinosum*. Cortical assimilatory filaments (SUVA (USP) 748). Scale bar = 20 µm. **Fig. 104.** *Scinaia aborealis*. Surface of thallus (SUVA (USP) 747). Scale bar = 20 µm. **Fig. 105.** *Scinaia aborealis*. Cross-section of thallus (SUVA (USP) 747). Scale bar = 20 µm. **Fig. 106.** *Erythrotrichia carnea*. Habit (SUVA (USP) S13: 8). Scale bar = 20 µm. **Fig. 107.** *Corynocystis prostrata*. Habit showing pedicellate lateral cystocarps (SUVA (USP) 1184). Scale bar = 5 mm. **Fig. 108.** *Corynocystis prostrata*. Cross-section of thallus (SUVA (USP) 1184). Scale bar = 10 µm.

Representative Material Examined

Nasese (*South*, 8.iv.1993: SUVA (USP) 568, S1: 16, S1: 17).

Plants to 500 µm tall, with non-persistent original spore and a prostrate system of a limited, pseudo-parenchymatous disk. Erect filaments freely and irregularly branched,

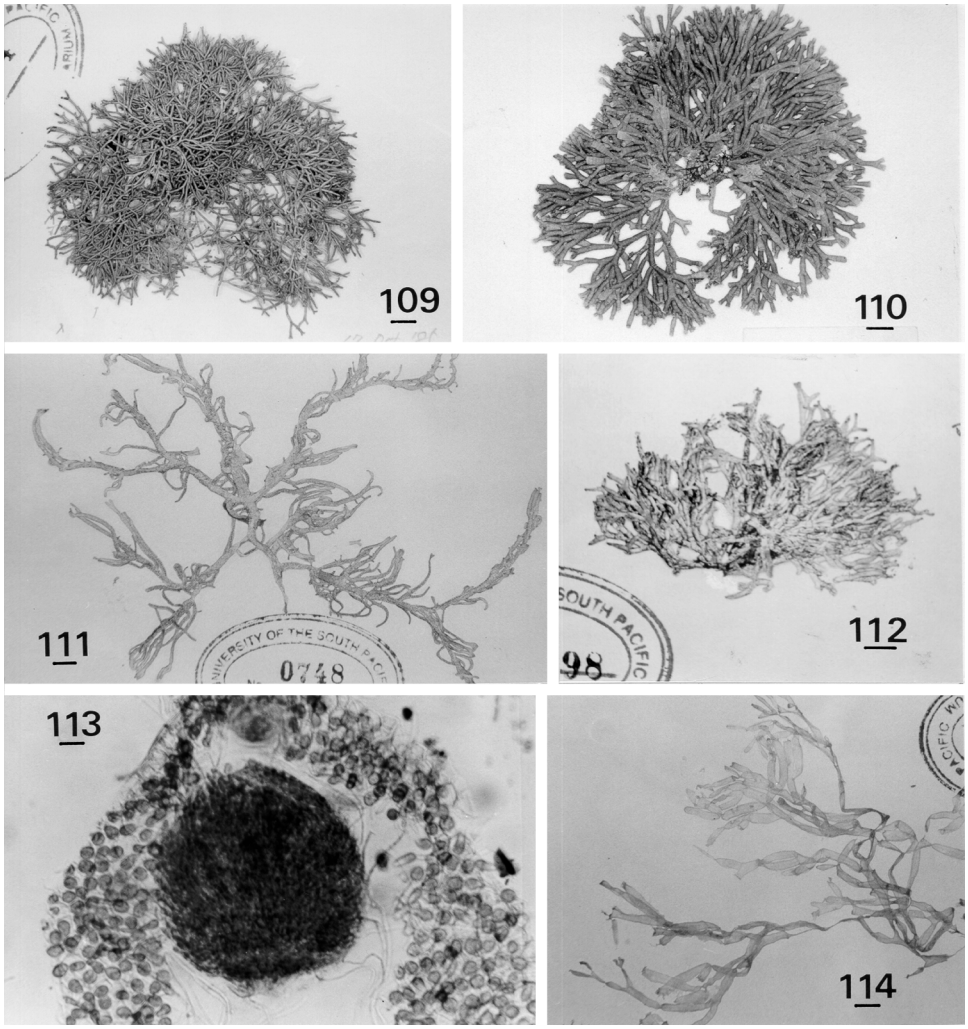


Fig. 109. *Actinotrichia fragilis*. Habit (SUVA (USP) 674). Scale bar = 6 mm. **Fig. 110.** *Galaxaura rugosa*. Habit (SUVA (USP) 1144). Scale bar = 6 mm. **Fig. 111.** *Ganonema farinosum*. Habit (SUVA (USP) 748). Scale bar = 6 mm. **Fig. 112.** *Liagora setchellii*. Habit (SUVA (USP) 698). Scale bar = 4 mm. **Fig. 113.** *Scinaia aborealis*. Mature cystocarp (SUVA (USP) 747). Scale bar = 20 µm. **Fig. 114.** *Scinaia aborealis*. Habit (SUVA (USP) 747). Scale bar = 5 mm.

unicellular hairs lacking; chloroplast single, parietal and with one pyrenoid, monosporangia sessile or stalked, frequent and single, in secund series along the laterals.

Habitat and Remarks

Found as an abundant epiphyte on the leaves of the seagrass *Halodule uninervis* (Forsskål) Ascherson and on the filaments of the green alga *Chaetomorpha crassa* (C.Agardh) Kützing. See Woelkerling (1973, p. 560) for nomenclature and synonymy.

Order **Nemaliales** Schmitz in Engler 1892: 17
Family **Galaxauraceae** Parkinson 1983: 608
Genus ***Actinotrichia*** Decaisne

Actinotrichia fragilis (Forsskål) Børgesen 1932: 6; Dawson 1954: 416, fig. 28*b*; Verheij and Prud'homme van Reine 1993: 167, pl. 14, fig. 1; Abbott 1999*a*: 64, fig. 7*A–C* (Figs 109, 117*a*, *b*)

Basionym and Nomenclatural Synonymy

Fucus fragilis Forsskål 1775: 190 (type locality: Mokha, Yemen).

Fiji and Rotuma Records

Grunow 1874: 39 (as *Actinotrichia rigida*); Chapman 1971: 168; Kasahara 1985: 44; South 1991: 7; South and Kasahara 1992: 56; N'Yeurt 1996: 407, fig. 113; N'Yeurt *et al*. 1996*b*: 71.

Representative Material Examined

Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 674; *Faloon*, 22.x.1993: SUVA (USP) 762); Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 279); Suva Barrier Reef (*Kasahara*, 16.ix.1985: SUVA (USP) 673; 24.ix.1985: SUVA (USP) 672).

Plants up to 2 cm high, reddish-brown in colour, forming densely and regularly dichotomously branched thalli; angle of branching 30–40° below, 85–90° at the tips; apices blunt. Texture crisp and rigid when dry. Segments terete, 380–440 µm in diameter, provided with characteristic closely spaced, whorled annular, pigmented simple assimilatory filaments 13–14 × 170–171 µm, with rounded apices. Short assimilatory filaments of cortex 12–13 µm in diameter, terminally inflated, 2 or 3 layers thick and dichotomously branched. Non-hairy portions of thallus with squarish outermost cortical cells 13–14 µm in diameter and 2 or 3 layers of ovoid to subspherical inner cortical cells 13–14 × 27–28 µm. Medullary filaments 4–6 µm in diameter, densely interwoven. Collections sterile.

Habitat and Remarks

Commonly found intertidally on the reef flat.

Genus ***Galaxaura*** Lamouroux 1812: 185

Fourteen species of *Galaxaura* were reported from Fiji in N'Yeurt *et al*. (1996) but a revision of these records herein has reduced many of them into synonymy.

Key to the Suva Lagoon and Reef Species of *Galaxaura* and *Tricleocarpa*

1. Thallus terete throughout 2
   Thallus flattened throughout, or at least in upper portions . . . . . *G. marginata*
2. Upper segments villous 3
   Upper segments glabrous 4
3. Assimilatory and medullary filaments structurally homogenous, tumid basal and supporting cells absent . . . . . *G. filamentosa*
   Assimilatory filaments both long and short with inflated globose terminal cell on short filament; tumid basal and supporting cells present . . . . . *G. fasciculata*
4. Upper segments annulate, inner cortical cells fused laterally; cystocarp with gonimoblastic pericarp . . . . . *G. rugosa*
   Upper segments smooth; inner cortical cells not fused laterally; cystocarp with sterile pericarp . . . . . Genus *Tricleocarpa*

Galaxaura fasciculata Kjellman 1900: 53, 54, pl. 5, figs 1–9, pl. 20, fig. 14 (type locality: Celebes, Indonesia); Dawson 1954: 419, fig. 29*b*; 1956: 45, fig. 35; Papenfuss *et al*. 1982: 406, 407, figs 3, 31, 32, 43; Abbott 1999*a*: 66, fig. 7*D, E* (Fig. 116*a–d*)

Fiji and Rotuma Records

Chapman 1971: 168; Kasahara 1985: 46, pl. 8, fig. 1; South 1991: 7 (as *G. filamentosa*); N'Yeurt *et al*. 1996*b*: 72.

Representative Material Examined

Suva Barrier Reef (*South*, 6.v.1993: SUVA (USP) 627); Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 687, 704); Mburelevu, Tailevu Point (*Chapman*, 6.v.1967: AKU 100167); Nasova Bay (*Kasahara*, 19.x.1985: SUVA (USP) 1022); Dravuni I., Kadavu (*South*, 10.iv.1991: SUVA (USP) 284, as *G. filamentosa*).

Non-Fijian Representative Material Examined

Ta'apuna, Tahiti I., French Polynesia (*Payri and N'Yeurt*, 7.v.1997: SUVA (USP) 1138).

Thallus 5–6 cm high, terete and subdichotomously to umbellately branched; mostly villous in upper parts, less so below; colour dark reddish-brown. Branches 0.8–1.5 mm in diameter, semi-rigid and inarticulated. Medullary filaments 8–12 µm in diameter; cortex pseudoparenchymatous and consisting of tumid basal cells of assimilators and their supporting cell; fasciculate extended assimilatory filaments 1–2 mm × 17–18 µm, with poorly developed supporting cell; short assimilators with a subcylindrical tumid basal cell 40–41 × 18–20 µm, usually with a lateral branch; terminal cell inflated, globose and larger than supporting cell, 34–35 µm in diameter.

Habitat and Remarks

Grows intertidally, often under coral heads or in tide pools. The thinner, less villous and more rigid habit of this species distinguishes it in the field from the similar-looking *G. filamentosa*.

Itono (1985*a*) reported the related species *Galaxaura subfructiculosa* Chou ex W.R.Taylor from Dravuni Island, Kadavu, but no specimen matching that species could be located in collections in SUVA or AKU. Unfortunately, the whereabouts of Itono's collections from 1982 are unknown and thus verification of his record is not possible. All specimens examined from Viti Levu (and Tahiti) have globose inflated terminal cells on the short assimilating filaments, a feature characteristic of *G. fasciculata*. The only Kadavu specimen in SUVA (*South*, 10.iv.1991: SUVA (USP) 284) superficially resembling that species (but labelled as *G. filamentosa* Chou) was examined and found to in agreement with *G. fasciculata*.

Galaxaura filamentosa Chou in Taylor 1945: 139 (type locality: Sulfur Bay, Clarion I., Revilla Gigedo, Mexico); Chou 1945: 39, pl. 1, figs 1–6; pl. 6, fig. 1; Dawson 1954: 419, fig. 30*a*; Abbott 1999*a*: 67, fig. 7*F*

Taxonomic Synonymy

Galaxaura rudis Kjellman 1900 *sensu* Kasahara 1985 and Silva *et al*. 1987; but *G. rudis* included in *Galaxaura rugosa* (Ellis et Solander) Lamouroux according to Huisman and Borowitzka 1990. Papenfuss *et al*. (1982) include *G. rudis* as a taxonomic synonym of *G. lapidescens* (Ellis et Solander) Lamouroux. See remarks below.

Fiji and Rotuma Records

Kasahara 1985: 47, pl. 7, fig. 4, pl. 15, fig. *D*; Garbary *et al*. 1991: 255; South and Kasahara 1992: 56; N'Yeurt 1996: 408; N'Yeurt *et al*. 1996*b*: 72.

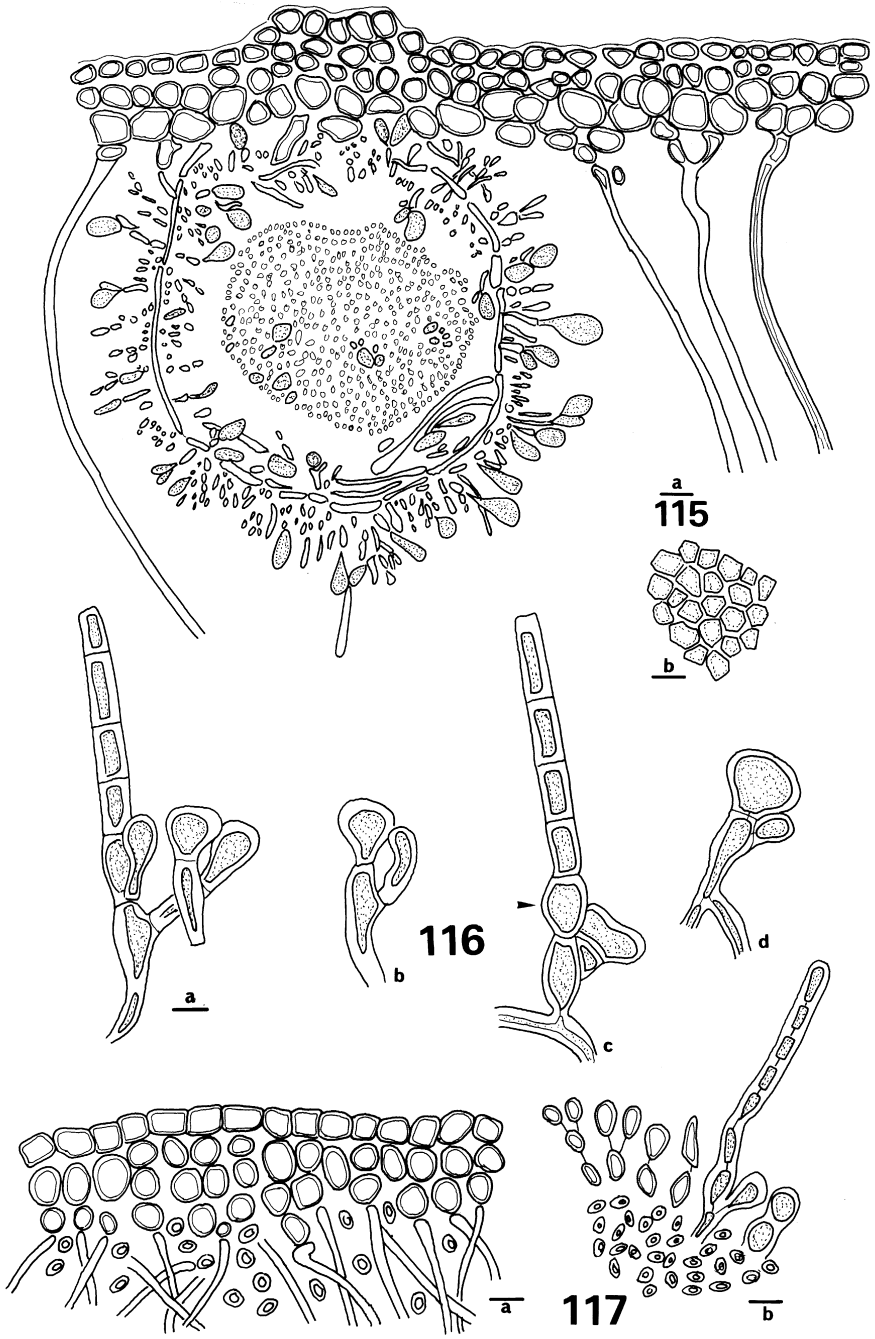


Fig. 115. (*a*) *Galaxaura rugosa*. Mature cystocarp (SUVA (USP) 1144). Scale bar = 20 µm. (*b*) Surface of decalcified thallus. Scale bar = 20 µm. **Fig. 116.** (*a–d*) *Galaxaura fasciculata*. Short and long assimilatory filaments and tumid basal cell (arrowhead) (SUVA (USP) 627). Scale bar = 20 µm. **Fig. 117.** (*a*) *Actinotrichia fragilis*. Cross-section of thallus (SUVA (USP) 674). Scale bar = 20 µm. (*b*) Cross-section of thallus in region of long assimilatory filaments. Scale bar = 20 µm.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 10.ix.1985: SUVA (USP) 729); Fish Patch (*Keats*, 19.viii.1994: SUVA (USP) 805; 23.viii.1994: SUVA (USP) 789).

Plants 2.5–3 cm high, bushy and hirsute, attached to substratum via a small discoidal holdfast. Branches whitish-pink, terete, densely covered with fine, dark-red, extended assimilatory filaments 18–25 µm × 1–4 mm. Axial and assimilatory filaments structurally homogenous, with absence of tumid basal cells and with undifferentiated supporting cells. Plants sterile.

Habitat And Remarks

The Fijian plants agree well with the description by Chou (1945), particularly concerning the absence of tumid basal cells. Chou (1945, p. 40) was of the opinion that *G. rudis* is distinct from *G. filamentosa*, in that the former has well-developed supporting and tumid basal cells, as described by Kjellman (1900).

Galaxaura marginata (Ellis et Solander) Lamouroux 1816: 264; Papenfuss *et al*. 1982: 411, figs 7–9, 24, 36, 37; Huisman and Borowitzka 1990: 157, figs 14–27; Millar 1990: 304, fig. 6*A–G*; Womersley 1994: 113, figs 32*A–F*, 33*B–D*; Abbott 1999*a*: 67, fig. 7*G–H* (Figs 118–122)

Basionym and Nomenclatural Synonymy

Corallina marginata Ellis et Solander 1786: 115, pl. 22, fig. 6 (type locality: Bahamas).

Taxonomic Synonymy

Huisman and Borowitzka (1990) and Silva *et al*. (1996) give a number of synonyms for this variable species.

Fiji and Rotuma Records

Grunow 1874: 38; Chapman 1971: 168 (as *G. hystrix*); Itono 1985*a*: 46, fig. 4 (as *G. stupocaula*); 1985*a*: 48, fig. 5 (as *G. ventricosa*); Kasahara 1985: 45, pl. 9, fig. 1 (as *G. apiculata*); 1985: 48, pl. 9, fig. 2; N'Yeurt *et al*. 1996*b*: 72.

Representative Material Examined

Fish Patch, Suva Barrier Reef (*Brooks*, 21.iii.1995: SUVA (USP) 1145; *Keats*, 10.v.1994: SUVA (USP) 765; 21.ix.1994: SUVA (USP) 796); Nukubuco Pass, between Sandbank and reef crest, Suva (*Carlson*, 17.xii.1972: SUVA (USP) 285, as *G. hystrix* Kjellman); Deuba, Viti Levu (*Carlson*, 8.x.1972: SUVA (USP) 286, as *G. hystrix* Kjellman); Tagagge, Viti Levu (*Kasahara*, 3.x.1985: SUVA (USP) 1041; 15.x.1985: SUVA (USP) 1042); Yaqata I., Yasawa Group (*Würtz*, 17.ix.1992: SUVA (USP) 587); Dravuni I., Kadavu Group (*Würtz*, 4.ix.1992: SUVA (USP) 585); Korolevu, Viti Levu (*Abbott, Nicholson and Phillips*, 14.vii.1973: BISH 623700).

Thallus 3–5 cm high, light pink to greenish-yellow when dry, smooth and glabrous; flattened; regularly dichotomously branched with bifurcate apices that are distally darkly pigmented and thickened lateral margins that become inrolled when dry. Holdfast discoid, about 5 × 8 mm. Branches 1–2 mm wide; branching up to the sixth order; angle of branching 50–60°.

Verprecula (sexual) stage with a pseudoparenchymatous cortex 2 or 3 cells thick, composed of an outermost layer of semilunar cells 18–20 × 7–8 µm, hexagonal in surface view; and lower layers of isodiametric to ovoid cells 21–42 µm in diameter. Innermost cortical cells strongly compressed and longer than broad, 36–43 × 11–17 µm. Central

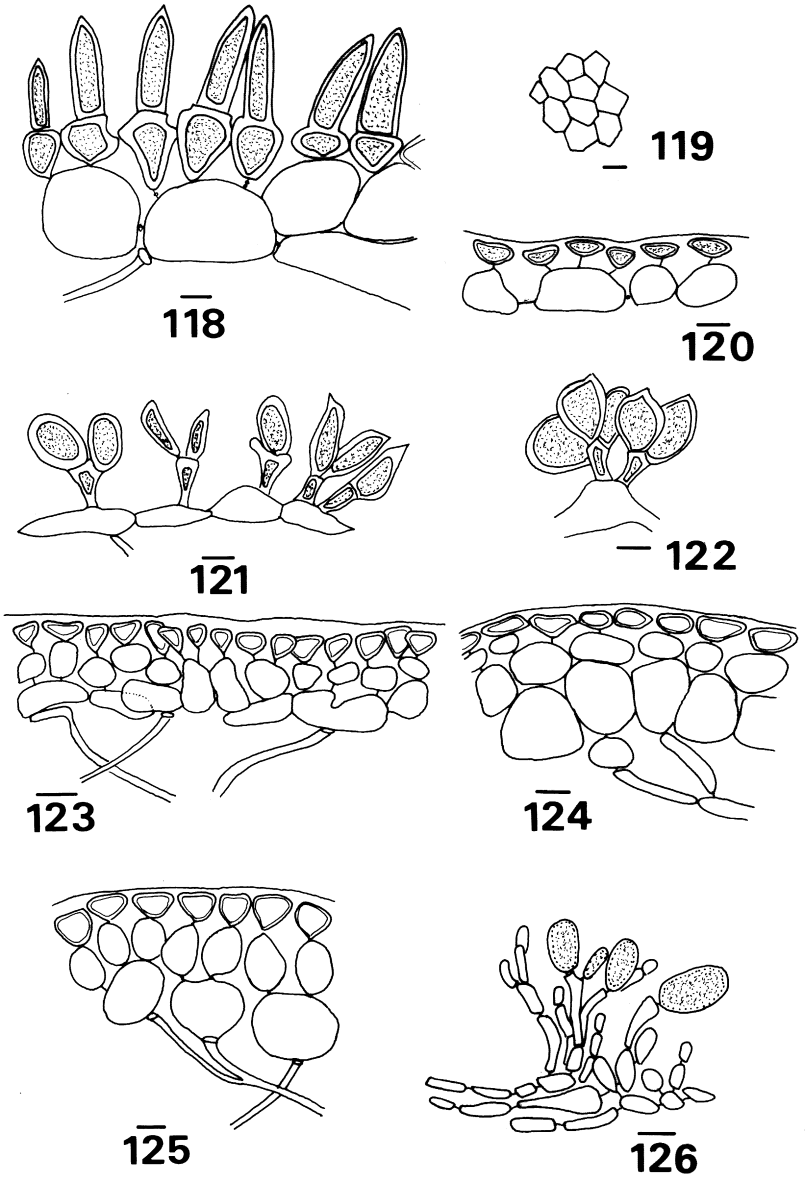


Fig. 118. *Galaxaura marginata*. Verprecula stage: section of thallus showing fusiform spinulose cells on each cortical cell. (SUVA (USP) 585). Scale bar = 10 µm. **Fig. 119.** *Galaxaura marginata*. Surface of thallus in mid-portion (SUVA (USP) 585). Scale bar = 20 µm. **Fig. 120.** *Galaxaura marginata*. Verprecula stage: section of thallus in centre of thallus, showing absence of spinulose cells and semilunar cortical cells (SUVA (USP) 585). Scale bar = 20 µm. **Fig. 121.** *Galaxaura marginata*. Brachycladia stage: cortical cells bearing subglobose terminal cells (SUVA (USP) 1145). Scale bar = 20 µm. **Fig. 122.** *Galaxaura marginata*. Brachycladia stage: detail of terminal cells (SUVA (USP) 1145). Scale bar = 20 µm. **Fig. 123.** *Galaxaura rugosa*. Cross-section of thallus showing fused inner cortical cells (SUVA (USP) 1144). Scale bar = 20 µm. **Fig. 124.** *Tricleocarpa fragilis*. Cross-section of thallus, showing first inner cortical cells which are broader than long (SUVA (USP) 628). Scale bar = 10 µm. **Fig. 125.** *Tricleocarpa cylindrica*. Cross-section of thallus, showing first inner cortical cells which are longer than broad SUVA (USP) 1141). Scale bar = 10 µm. **Fig. 126.** *Tricleocarpa fragilis*. Detail of ovoid carpospores (SUVA (USP) 628). Scale bar = 10 µm.

medulla of coarse filaments, 6–7 µm in diameter. Fusiform spinulose cells 32–35 × 8–10 µm present on every cortical cell, but restricted to the thickened marginal regions of the thallus only ovoid; cystocarps spherical and ostiolate, 200–240 µm in diameter, embedded in the filamentous medulla of the marginal regions. Mature carposporangia uninucleate and ovoid, 21–29 µm in diameter. Spermatia and tetrasporangia not seen.

Brachycladia (asexual) stage with a monostromatic cortical parenchyma; cells large and compressed, about 30–31 µm high, bearing 1 or 2 cuneate to cylindrical stalk cells, 21–23 µm long, with subglobose, oval or pyriform terminal cells 14–36 × 43–50 µm; distal end wall mostly rounded but often apiculate.

Habitat and Remarks

Grows intertidally, close to the reef passes, in the lagoon at depths of about 10 m (Itono 1985a) and down to a depth of 40 m on the outer reef slope (Fish Patch).

This species was earlier reported from Fiji by Chapman (1971) as *Galaxaura hystrix* Kjellman, by Itono (1985a) as *G. stupocaula* Kjellman and *G. ventricosa* Kjellman and by Kasahara (1985) as *G. apiculata* Kjellman. Examination of the specimens housed in SUVA revealed they all agree with *G. marginata* as circumscribed by Papenfuss *et al*. (1982) and Huisman and Borowitzka (1990).

There is much confusion in the literature with respect to flattened species of *Galaxaura* close to *G. marginata*. Characters that have been used to separate species include the angle of branching, stipe length and arborescence versus frutescence of the thallus (Tanaka 1936); presence and position of spinulose terminal cells (Chou 1945; Itono 1980) and the smooth or apiculate nature of the distal wall of the terminal cells of the sporophyte (Kjellman 1900; Kasahara 1985). All these characters have been shown to be highly variable within the same species and seem unreliable grounds for species separation (Papenfuss *et al*. 1982; Huisman and Borowitzka 1990; this study). From Table 1, it can be seen that most flattened *Galaxaura* species examined in this study have an angle of branching ranging from 50 to 60°, with much variation above and below that range. The Lectotype of *G. marginata* ranges from 40 to 50°, which is broadly in agreement with the Fijian material, although this character (branching angle) seems to be variable and is not a good one for species segregation. Both 'arborescent' and 'frutescent' branches occur in the Fijian collections (sometimes on the same plant), although the difference between these terms is often subjective and is not a reliable character. The Fijian specimens all have spinulose cells restricted to the marginal regions of the gametophyte, but this feature is also reported in *G. marginata* from Australia by Huisman and Borowitzka (1990), who add that this apparent restriction is very variable from specimen to specimen and spinulose cells often occur randomly on the thallus. Consequently, spinulose cell location is not an important species-distinguishing character (J. M. Huisman, pers. comm.).

The Brachycladia-stage Fijian plants have both apiculate and rounded terminal cells often adjacent to each other, as was reported for Indian Ocean material by Papenfuss *et al*. (1982). The relative percentage of these two kinds of cells varies greatly from specimen to specimen. Kasahara (1985, p. 46) reported material from Suva which he described as *G. marginata* with 'only round vesicles' and *G. apiculata* from Suva and Dravuni Island with 'mostly apiculate vesicles'. His specimens (collected in 1982) are not deposited in SUVA and could not be located (H. Kasahara having in the interim left the field of phycology). However, plants with only round vesicles were not found in the available collections from Suva examined and it is probable that Kasahara's specimens exhibited an environmentally induced variation. The effect of the environment and climate is thought to

Table 1. Angle of branching and life stage for various flattened *Galaxaura* species

Species of flattened *Galaxaura* (Suva Lagoon and Reef specimens shaded)	Angle of branching range (degrees)		Life stage (sexual = Verprecula; asexual = Brachycladia)
	30–40	40–70	
Galaxaura marginata (lectotype; Ellis and Solander 1786, Bahamas)		40–50	Verprecula; spermatangial
Galaxaura hystrix (Tanaka 1936, Japan)	30–35		Verprecula
Galaxaura hystrix (Itono 1980, Micronesia)		50–55	Verprecula
Galaxaura veprecula (Tanaka 1936, Japan)		45–60	Verprecula
USP 285 (Suva, Fiji)		50–60	Brachycladia
USP 286 (Deuba, Fiji)		40–50	Brachycladia
USP 585 (Dravuni I., Kadavu, Fiji)	35–40		Verprecula; cystocarpic
USP 587 (Yaqeta I., Yasawa Group, Fiji)		40–45	Verprecula
USP 765 (Suva, Fiji)		50–60	Brachycladia
USP 796 (Suva, Fiji)		50–60	Verprecula; cystocarpic
USP 1041, 1042 (Tagagge, Fiji)		40–50	Verprecula; cystocarpic
USP 1145 (Suva, Fiji)		50–60	Brachycladia
BISH 623700 (Korolevu, Fiji)		60–70	Brachycladia

vary the degree of branching, bushiness and type of terminal cells in *Galaxaura* species (Papenfuss *et al*. 1982). Itono (1985*a*) separated his Fijian *G. stupocaula* from *G. ventricosa* (the latter now synonymised with *G. marginata*; Silva *et al*. 1996) based on the lower stem-like portion of the former species, a feature probably due to variations in environmental conditions. Although his specimens were sterile, Itono hinted at the possibility that the two flattened species could be different generations of the same entity, which seems correct now that cystocarpic Verprecula stages have been found.

Galaxaura rugosa (Ellis et Solander) Lamouroux 1816: 263; Chou 1947: 13, pl. IV, figs 12, 13; pl. X, fig. 2; Huisman and Borowitzka 1990: 153–157, figs 1–13; Verheij and Prud'homme van Reine 1993: 168, pl. 14, fig. 3; Abbott 1999*a*: 68, fig. 8*A–E* (Figs 110, 115*a, b*, 123)

Basionym and Nomenclatural Synonymy

Corallina rugosa Ellis et Solander 1786: 115, pl. 22, fig. 3 (type locality: Jamaica).

Taxonomic Synonymy

Huisman and Borowitzka (1990) and Silva *et al.* (1996: 110) give a number of synonyms for this species.

Fiji and Rotuma Records

Grunow 1874: 38 (as *G. lapidescens*); Dickie 1876; Itono 1985*a*: 45, fig. 2 (as *G. glabriuscula*); Kasahara 1985: 51, pl. 8, fig. 4; (as *G. subverticillata*, p. 52, pl. 8, fig. 5); South 1991: 7; N'Yeurt *et al.* 1996*b*: 72.

Representative Material Examined

Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 703; *Faloon*, 22.x.1993: SUVA (USP) 767, 768, 776; *N'Yeurt*, 11.viii.1997: SUVA (USP) 1144, *cystocarpic*).

Gametophytic thallus 5–7 cm high, dichotomously branched; segments 1–1.5 mm in diameter, terete and rugose, glabrous below but with distinct annulations on upper branches. Distance between dichotomies 5–8 mm. Graded cortex 3- or 4-layered; inner

cortical cells large and clear, broader than long, 31–55 × 14–18 µm, fused laterally; outer cortex composed of pigmented ovoid to pyriform cells 14–16 × 14–15 µm. Medullary filaments 3–5 µm in diameter. Mature cystocarps ostiolate, spherical, 214–215 µm in diameter, with a central placenta 148–150 µm in diameter and a distinct pericarp formed of gonimoblast filaments. Carposporangia ovoid to obovoid, up to 12–18 µm in diameter, borne singly or in pairs atop short gonimoblast filaments 15–24 × 3–4 µm; distributed on all sides of the pericarp, especially on the outward surface. Sporophyte not seen.

Habitat and Remarks

Growing intertidally on the reef at Makaluva Island.

According to Huisman and Borowitzka (1990, p. 157), this species often has a hirsute basal portion anatomically similar to *Galaxaura filamentosa* and further research could show these two species as being synonymous. They also consider *G. subverticillata* conspecific with *G. lapidescens* (the tetrasporic stage of *G. rugosa*) based on the high variability of the characters used to distinguish the two species (whorled versus evenly distributed cortical filaments). However, Littler and Littler (1997, p. 24) retain the two species separate as they did not find intergrading populations in Belise habitats. A noticeable feature of the gametophyte is the abundance of carposporangia on the outward-facing surface of the pericarp, with few inward-directed ones.

Genus ***Tricleocarpa*** Huisman et Borowitzka 1990: 164

Key to the Suva Lagoon and Reef Species of *Tricleocarpa*

1. Segments 0.5–1 mm in diameter; first inner cortical cells longer than broad . . . . . *T. cylindrica*
   Segments 1.5–2 mm in diameter; first inner cortical cells broader than long. . . . . *T. fragilis*

Tricleocarpa cylindrica (Ellis et Solander) Huisman et Borowitzka 1990: 164–168, figs 40–45, 50–52; Millar 1990: 306, fig. 5*A–C*; Huisman and Womersley 1994: 116–118, fig. 32*G*; Abbott 1999*a*: 73, fig. 10*A* (Fig. 125)

Basionym and Nomenclatural Synonymy

Corallina cylindrica Ellis et Solander 1786: 114, pl. 22, fig. 4 (type locality: West Indies).
Galaxaura cylindrica (Ellis et Solander) Lamouroux 1821: 22, pl. 22, fig. 4; Chou 1947: 5, pl. I, figs 1–12; pl. VIII, fig. 1.

Fiji and Rotuma Records

Grunow 1874: 37 (as *G. fastigiata*); Chapman 1971: 168 (as *G. fastigiata*);

Representative Material Examined

Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) 779); Suva Barrier Reef (*Keats*, 21.ix.1994: SUVA (USP) 1141, 1142).

Gametophytic thallus moderately calcified, 9–16 cm high; dichotomously branched, distance between dichotomies 7–9 mm; branch apices hollow. Segments terete and jointed, 0.5–1.0 mm in diameter, cylindrical; glabrous and brittle when dry. Graded cortex 3- or 4-layered; inner cortical cells large, subspherical to oval, 19–32 µm in diameter, not fused laterally. Outermost cortical cells ovate to pyriform, 12–14 × 9–15 µm; first inner layer composed of pyriform to ovoid cells 11–16 × 17–22 µm, longer than broad. Reproduction not seen.

Habitat and Remarks

Growing on the outer reef slope, at 10–15-m depth.

Galaxaura fastigiata was synonymised with *G. oblongata* by Papenfuss *et al.* (1982, p. 415), but retained as a separate species by Huisman and Borowitzka (1990, p. 168) on the basis of vegetative and reproductive differences between the two species. The two Fijian *Tricleocarpa* species are in agreement with these differences (at least vegetatively); *T. cylindrica* having consistently narrower segments and more elongate inner cortical cells than *T. oblongata*.

Tricleocarpa fragilis (Linnaeus) Huisman et Townsend 1993: 100, table 2; Abbott 1999*a*: 74, fig. 10*B–G*; Millar *et al.* 1999: 553, fig. 1*C* (Figs 124, 126)

Basionym

Eschara fragilis Linnaeus 1758: 805 (type locality: 'Oceano Americano'; Jamaica *fide* Huisman and Townsend 1993).

Fiji and Rotuma Records

Kasahara 1985: 49, pl. 8, fig 2 (as *G. oblongata*); N'Yeurt *et al.* 1996*b*: 73.

Representative Material Examined

Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 705; *Keats*, 10.v.1994: SUVA (USP) 781); Nukulau I. (*Gounder*, *N'Yeurt*, *Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 287); Suva Barrier Reef (*South*, 20.vi.1992: SUVA (USP) 648; 6.v.1993: SUVA (USP) 628, 629, *cystocarpic*).

Gametophytic plant purplish-pink, up to 70 mm high and lightly calcified, with terete subdichotomous branches 1–2 mm in diameter; texture glabrous and smooth, brittle when dry. Branching subdichotomous, with distance between dichotomies about 6–8 mm; segments more or less oblong to basally tapered in shape. Graded cortex 3- or 4-layered: innermost cells colourless and inflated, 19–26 µm in diameter, not laterally attached; outermost cortical cells pigmented, ovate to spindle-shaped, 12–17 × 4–8 µm. Medullary filaments 3–6 µm in diameter, subdichotomously to irregularly branched. Cystocarps ovate, 535–570 µm in diameter, with a well-defined involucre of sterile filaments. Gonimoblast filaments 3–4 × 2–3 µm, arising from the base of the cystocarp cavity, intermingled with 3- or 4-celled sterile paraphyses. Terminal carposporangia ovate to ovoid, 7.5–12 × 14–20 µm. Sporophyte not seen.

Habitat and Remarks

Found on the outer reef wall, at depths of 3–15 m.

Genus ***Scinaia*** Bivona-Bernardi 1822: 232

Scinaia aborealis Huisman 1986: 278, figs 23–35 (type locality: Ocean Reef Marina, Sorrento, WA, Australia); Millar 1990: 307, fig. 7*A–C*; Womersley 1994: 101, figs 27*D–F*; 28*C, D* (Figs 104, 105, 113, 114)

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 73.

Representative Material Examined

Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) 688, 747, 773, S15: 3, *cystocarpic*); Suva Barrier Reef (*Keats*, 30.xi.1994: SUVA (USP) 1178, S14: 14).

Thallus 80–90 × 1–2 mm, attached to the substratum via a small discoid holdfast. Branching dichotomous, with terete segments 8–40 mm long, constricted at dichotomies. Structure as for genus, with a central axis of entwined filaments 2–5 µm in diameter. Outer cortex composed of distally flattened, clear subrectangular utricles 20–21 × 25–30 µm, borne on 1 or 2 layers of pigmented subspherical hypodermal cells 8–10 µm in diameter. Utricles hexagonal and closely adhering to each other in surface view. Mature cystocarps 165–170 µm in diameter, urceolate and ostiolate, embedded in outer medulla. Spermatangia and tetrasporangia not seen.

Habitat and Remarks

Growing at a depth of 10–15 m. The Fijian material is in good agreement with the description of the species by Huisman (1986).

Family **Liagoraceae** Kützing 1843: 321, 328
Genus ***Ganonema*** Fan et Wang 1974: 492 emend. Huisman et Kraft 1994: 76

Ganonema farinosum (Lamouroux) Fan et Wang 1974: 492 ('*farinosa*'); Yoshizaki 1982: 270–277, figs 1–22; Abbott 1999*a*: 77, fig. 11*A–G* (Figs 103, 111)

Basionym and Nomenclatural Synonymy

Liagora farinosa Lamouroux 1816: 240 (type locality: Suez, Egypt); Womersley 1994: 94, pl. 2, fig. 2; figs 24*B*, 25*E–H*.

Fiji and Rotuma Records

Grunow 1874: 36 (as *Liagora pressei* Kützing var. *pacifica*); Chapman 1971: 167 (as *Liagora farinosa*); N'Yeurt *et al.* 1996*b*: 73 (as *Liagora farinosa*).

Representative Material Examined

Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) 748).

Thallus to 9 cm high, greyish-green in colour when dried, moderately calcified and farinaceous, subdichotomously branched at intervals up to 2 cm. Cortical assimilatory filaments with oblong cells 10–12 µm in diameter; not constricted. Basal cell of cortical fascicles 15–16 µm in diameter, highly differentiated from other cells of filament. Spermatangial heads terminal on cortical filaments.

Habitat and Remarks

Growing on the reef flat. The Fijian material was examined by Professor M. Yoshizaki and confirmed as belonging to *Ganonema farinosum*.

Genus ***Liagora*** Lamouroux 1812: 185

Key to the Suva Lagoon and Reef Species of *Liagora*

1. Thallus cylindrical and smooth. . . . . *L. setchellii*
   Thallus compressed and farinaceous. . . . . *L. ceranoides* f. *leprosa*

Liagora ceranoides Lamouroux 1816: 239 (type locality: St Thomas, Virgin Is); Abbott 1945: 156, figs 8, 9; 1999*a*: 84, fig. 13*I–M*

forma ***leprosa*** (J.Agardh) Yamada 1938*a*: 155; Dawson 1953: 38, pl. 2, figs 13–15, pl. 17, fig. 3.

Basionym and Nomenclatural Synonymy

Liagora leprosa J.Agardh 1847: 8 (type locality: Veracruz, Mexico).

Fiji and Rotuma Records

Chapman 1971: 167; Kasahara 1985: 41, pl. 7, fig. 1; N'Yeurt *et al.* 1996*b*: 73 (all as *Liagora ceranoides*).

Representative Material Examined

Fish Patch (*Keats*, 30.xi.1994: SUVA (USP) 1179); Suva Barrier Reef (*Chapman*, v.1967: AKU 100170).

Thallus up to 5 cm high, soft, calcified and regularly dichotomously branched, with density of branching increasing in upper portions. Branches 1–1.2 mm wide; compressed and farinaceous to grained when dry; lateral proliferations absent. Assimilatory filaments 280–300 µm in diameter, dichotomously branched. Cells cylindrical in lower portions, becoming clavate to ellipsoidal toward apices, about 10 µm in diameter. Peripheral cells with 2 or 3 projecting antheridia, carpogonial branches straightly curved, 3- or 4-celled, 10–14 µm in diameter, lateral on middle of assimilatory filaments.

Habitat and Remarks

Growing at a depth of 30 m. Yamada (1938*a*) divided *L. ceranoides* into two formae based on the lack (f. *leprosa*) or presence (f. *typica*) of short lateral proliferations on branches. The Fijian material does not show any lateral proliferations and thus agrees with f. *leprosa*.

Liagora setchellii Yamada 1938*b*: 13, figs 7, 8, pl. 3, fig. 2 (syntype localities: Ogasawara-gunto (Bonin I.) and Ryukyu-retto, Japan; Kashoto, Taiwan); Abbott 1945: 153, figs 4, 5; 1999*a*: 91, fig. 17*F–H* (Fig. 112)

Fiji and Rotuma Records

Kasahara 1985: 42, pl. 7, fig. 2, pl. 15, fig. *B*; South 1991: 8; N'Yeurt *et al.* 1996*b*: 73.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 16.ix.1985: SUVA (USP) 698).

Thallus up to 10 cm across, smooth and cylindrical with jointed densely dichotomous branches 1–1.2 mm in diameter. Assimilatory filaments 200–350 µm in diameter, dichotomously branched. Cells cylindrical in lower portions, becoming clavate to ellipsoidal toward apices, about 10–15 µm in diameter. Two or three antheridia issued from peripheral cells; carpogonial branch 10–14 µm in diameter, 3–5-celled and lateral on middle of assimilatory filaments; slightly curved. Cystocarps with well developed involucres; carposporangia about 7 × 12 µm.

Habitat and Remarks

Growing on the reef flat.

Order **Gelidiales** Kylin 1923: 132
Family **Gelidiellaceae** Fan 1961: 317
Genus ***Gelidiella*** Feldmann et Hamel 1934: 529

Gelidiella acerosa (Forsskål) Feldmann et Hamel 1934: 533; Dawson 1954: 422, fig 33*g*; Norris 1992: 35, fig. 20; Price and Scott 1992: 25, fig. 4*A–E*; Abbott 1999*a*: 202, fig. 53*A–C*

Basionym and Nomenclatural Synonymy

Fucus acerosus Forsskål 1775: 190 (type locality: Mokha, Yemen).
Echinocaulon acerosus (Forsskål) Børgesen 1932: 5, pl. 1, fig. 3.

Fiji and Rotuma Records

Chapman 1971: 168; Kasahara 1985: 52; South 1991: 8; South and Kasahara 1992: 57; N'Yeurt 1996: 408, figs 110, 120*a*, *b*; N'Yeurt *et al.* 1996*b*: 73.

Representative Material Examined

Nukulau I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 289); Makaluva I. (*Kasahara*, 24.ix.1985: SUVA (USP) 684, 17.x.1985: SUVA (USP) 685); Laucala Bay (*Kasahara*, 9.ix.1985: SUVA (USP) 706; 22.ix.1985: SUVA (USP) 707); Suva Barrier Reef (*Carlson*, 14.i.1973: SUVA (USP) 294; 11.viii.1973: SUVA (USP) 295, both as *Gelidium rigidum*).

Thallus up to 5 cm high, greenish-yellow to dull purple, tough and wiry with decumbent basal parts attached by haptera and bearing free elongate, erect or arcuate-recurved secondary branchlets. Branchlets 458–500 µm in diameter, terete to slightly compressed, up to 45 × 1 mm, bearing terete filiform and determinate branchlets 2–8 mm long mostly secundly (sometimes radially) or bilaterally disposed. Apical cell about 12 µm in diameter, single and distinctly separated. External cortical cells anticlinally elongated; internal cortical cells somewhat rounded, grading into a medulla of elongate cells about 12–18 µm in diameter, sometimes up to 30 µm. Tetrasporic branches irregularly disposed, with 26–30 oblong–cruciate sporangia up to 33 × 65 µm, progressively developed from the apex and irregularly disposed below the cortical cells. Cystocarps not seen.

Habitat and Remarks

Commonly found on the reef crest, forming an encrusting turf exposed to heavy wave action. The distinction between *Gelidiella* and *Gelidium* is mostly based on the lack of rhizines in the vegetative thallus of the former, but this character is not always reliable and the genus is in need of taxonomic revision.

Family **Gelidiaceae** Kützing 1843: 390, 405
Genus ***Gelidium*** Lamouroux 1813: 128, *nomen conservandum*

Gelidium pusillum (Stackhouse) Le Jolis 1863: 139; Dawson 1954: 420, fig. 31*a–c*; Verheij and Prud'homme van Reine 1993: 182; Womersley 1994: 133, figs 35*E*, 39*E–K*; Abbott 1999*a*: 194, fig. 50*A*

Basionym and Nomenclatural Synonymy

Fucus pusillus Stackhouse 1795 (1795–1801): 16, pl. vi (type locality: Sidmouth, Devonshire, UK).

Fiji and Rotuma Records

Chapman 1971: 168; South and Kasahara 1992: 58; N'Yeurt 1996: 410, figs 111, 112, 196; N'Yeurt *et al.* 1996*b*: 73.

Representative Material Examined

Suva Point (*South*, 7.vii.1991: SUVA (USP) 462); Laucala Bay (*N'Yeurt*, 1991: SUVA (USP) S7: 2; *South*, 20.iv.1993: SUVA (USP) 638)

Plants dark purple, up to 4 mm high, forming compact tufts attached to the substratum via disc-like haptera. Erect blades distally terete and constricted, proximally compressed to flattened, strap-shaped; pinnate branches occasionally on the same plant. Apical cell single, distinct and often protruding. Internal rhizines sparse, mostly intermixed with innermost cortical cells and outermost medullary cells. Collections sterile.

Habitat and Remarks

Commonly found growing intertidally and close to the high tide mark in Laucala Bay and on rocks and other debris, including *Septifer* sp. molluscs. This species is highly variable and members of the same populations of plants exhibit a range of branch morphologies from terete to foliose (A. D. R. N'Yeurt, pers. obs.).

Order **Corallinales** Silva et Johansen 1986: 25 emend. Townsend *et al.* 1994
Family **Corallinaceae** Lamouroux 1812: 185
Subfamily **Amphiroideae** Johansen 1969: 47
Tribe **Amphiroeae** Cabioch 1971; 1972
Genus ***Amphiroa*** Lamouroux 1812: 185

Key to the Suva Lagoon and Reef Species of *Amphiroa*

1. Thallus terete throughout; axes usually 1 mm or less in diameter. . . . . *A. crassa*
   Thallus with flattened margins; axes usually more than 1.5 mm in diameter. . . . . *A. tribulus*

Amphiroa crassa Lamouroux in Quoy and Gaimard 1824: 627 (type locality: Shark Bay, WA, Australia)

Taxonomic Synonymy

Amphiroa godeffroyi Grunow 1874: 41 (type locality: Ovalau, Fiji).

Fiji and Rotuma Records

Grunow 1874: 41 (as *Amphiroa godeffroyi*); Chapman 1971: 169; Garbary *et al.* 1991: 253; N'Yeurt *et al.* 1996*b*: 75.

Representative Material Examined

Suva Barrier Reef (*Gussmann*, x.1997: SUVA (USP) 1183).

Thallus erect, up to 6 cm high, with dichotomously branched axes usually about 1 mm in diameter, or ranging from 0.5 to 2 mm in diameter. Angle of branching 30–60°, internodes terete to slightly compressed. Branches of uniform diameter or somewhat distally tapered; apices rounded. Uncalcified nodes apparent, or not so.

Habitat and Remarks

Commonly found in locally abundant patches near the passes and on the reef flat.

Amphiroa tribulus (Ellis et Solander) Lamouroux 1816: 302 (Figs 131, 134, 135*a–c*)

Basionym and Nomenclatural Synonymy

Corallina tribulus Ellis et Solander 1786: 124, pl. 21, fig. *e* (type locality: West Indies).

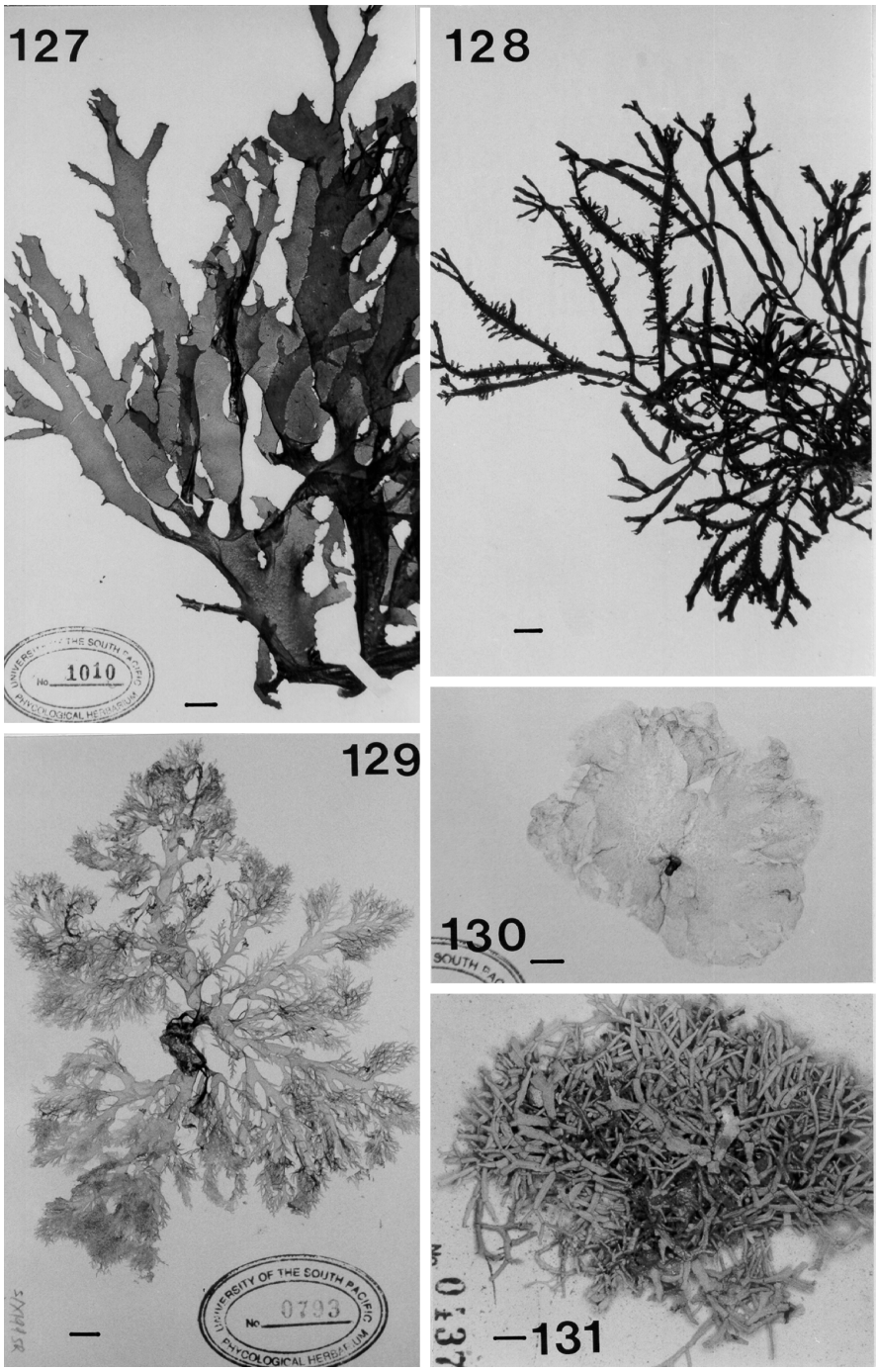


Fig. 127. *Halymenia durvillei*. Habit (SUVA (USP) 1010). Scale bar = 10 mm. **Fig. 128.** *Prionitis angusta*. Habit (SUVA (USP) 855). Scale bar = 5 mm. **Fig. 129.** *Halymenia floresia*. Habit. Scale bar = 8 mm. **Fig. 130.** *Gibsmithia dotyi*. Habit, showing perennial stipe (SUVA (USP) 908). Scale bar = 5 mm. **Fig. 131.** *Amphiroa tribulus*. Habit (SUVA (USP) 437). Scale bar = 10 mm.

Fiji and Rotuma Records

Kapraun and Bowden 1978: 201; N'Yeurt *et al.* 1996*b*: 75.

Representative Material Examined

Fish Patch (*Brooks*, 21.iii.1995: SUVA (USP) 1155); Makaluva I. (*South*, 9.ix.1991: SUVA (USP) 437); Suva Barrier Reef (*Keats*, 10.v.1994: SUVA (USP) 764).

Thallus pinkish, composed of calcified, brittle irregularly dichotomously branched and marginally flattened axes 1.5–4 mm wide and about 1 mm thick. Axes terete in middle portions, but strongly compressed to flattened on edges, imparting a keeled and winged appearance to branches. Medulla several tiered, with alternating short (17–22 µm) and long (36–40 µm) tiers and lateral secondary pit connections. Cortex several cells thick, found in both genicula and intergenicula, with epithelial cells 10–12 × 6–7 µm; hexagonal in surface view. Tetrasporangia 31–48 µm long, zonately divided, with tetrasporangial conceptacle roof connected to conceptacle floor by elongate cells that are peripheral and interspersed with the tetrasporangia. Spermatia and cystocarps not seen.

Habitat and Remarks

Commonly found on the reef flat and subtidally up to 10-m depth. The flattened wing-like edges of this species are characteristic in the field.

Tribe **Janieae** Johansen et Silva 1978: 414
Genus ***Cheilosporum*** (Decaisne) Zanardini 1844: 187

Key to the Suva Lagoon and Reef Species of *Cheilosporum*

1. Thallus 10–15 mm high; intergenicula distance 0.3–0.5 mm; colour dark purple . . . . . *C. acutilobum*
   Thallus 4–6 cm high; intergenicula distance 1–1.5 mm; colour pinkish . . . . . *C. spectabile*

Cheilosporum acutilobum (Decaisne) Piccone 1886: 66 (Figs 136, 154)

Basionym and Nomenclatural Synonymy

Amphiroa acutiloba Decaisne 1842: 125 (type locality: Mauritius).

Taxonomic Synonymy (fide *Srimanobhas* et al. *1990*: *104*)

Cheilosporum jungermannioides Ruprecht ex Areschoug 1852: 546, 547 (type locality: Tahiti).

Fiji and Rotuma Records

Chapman 1971: 169; N'Yeurt *et al.* 1996*b*: 76 (both as *Cheilosporum jungermannioides*).

Representative Material Examined

Makaluva I. (*Seeto*, 8.vi.1993: SUVA (USP) 683).

Thallus dark purple and delicate, 1.0–1.5 cm tall, consisting of intergenicular segments 1–1.5 × 0.3–0.5 mm, with simple, mostly acute (but at times rounded) marginal lobes. Lobe angle 41–42° (see Johansen 1977, p. 176, fig. 26 for lobe-angle calculation explanation). Main axes with a distally tapered outline. Segments with usually six tiers of medullary cells. Conceptacles 300–400 µm in diameter, embedded in fertile lobes.

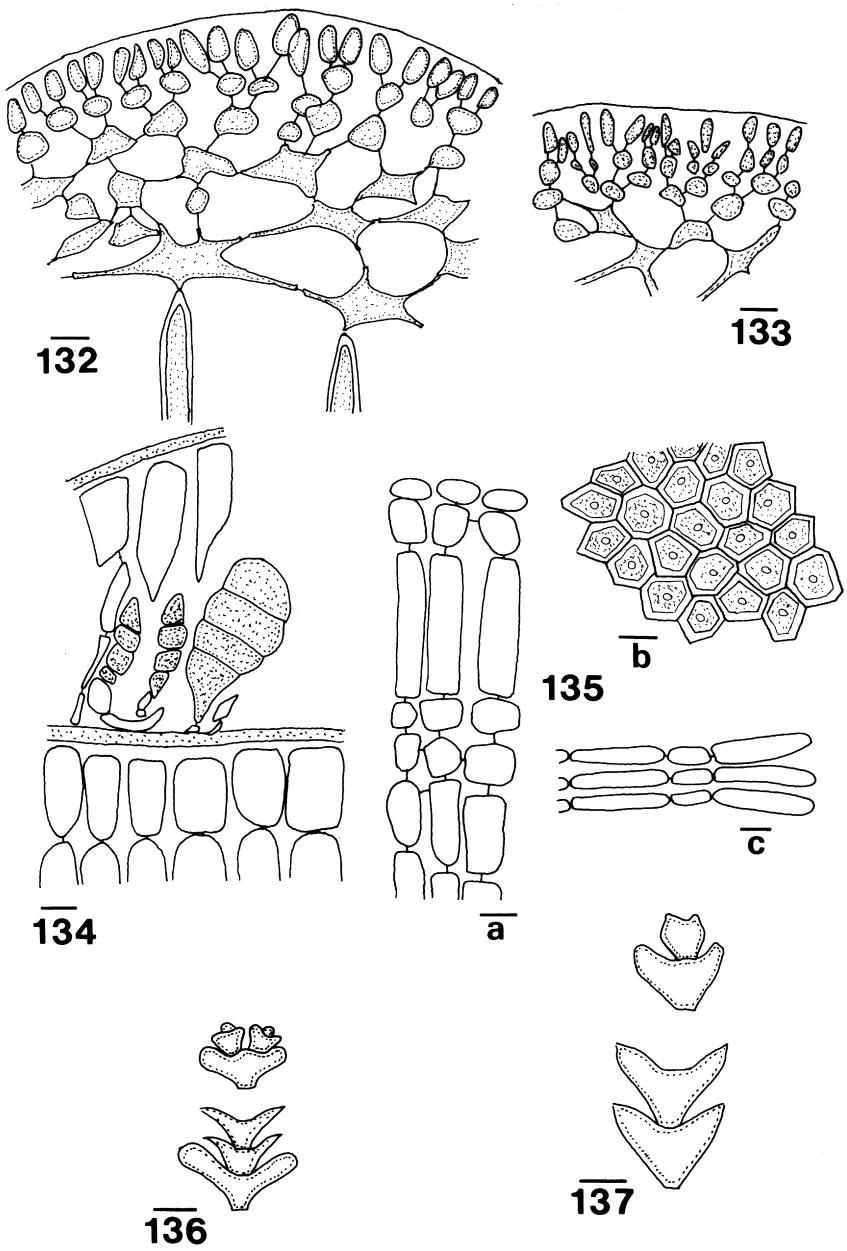


Fig. 132. *Halymenia durvillei*. Cross-section of thallus (SUVA (USP) 1010). Scale bar = 10 µm. **Fig. 133.** *Halymenia floresia*. Cross-section of thallus. Scale bar = 10 µm. **Fig. 134.** *Amphiroa tribulus*. Cross-section of tetrasporangial conceptacle. Note zonate tetrasporangia and elongate sterile cells connecting roof and floor of conceptacle (SUVA (USP) 437). Scale bar = 10 µm. **Fig. 135.** (*a*) *Amphiroa tribulus*. Cross-section of thallus showing medulla with lateral secondary pit connections and terminal epithelial cells (SUVA (USP) 437). Scale bar = 10 µm. (*b*) Surface of thallus. Scale bar = 10 µm. (*c*) Medullary filaments, showing alternating short and long tiers. Scale bar = 20 µm. **Fig. 136.** *Cheilosporum acutilobum*. Habit (SUVA (USP) 683). Scale bar = 500 µm. **Fig. 137.** *Cheilosporum spectabile*. Habit (SUVA (USP) 1171). Scale bar = 1 mm.

Habitat and Remarks

The Fijian material is in good agreement with authentic *C. jungermannioides* from the type locality of Tahiti held in UPF (A. D. R. N'Yeurt, pers. obs.). Srimanobhas *et al.* (1990, p. 104) put this species in synonymy with *C. acutilobum* (Decaisne) Piccone from the Indian Ocean; however the two species were retained separate by Børgesen (1950, pp. 7, 8) after comparing his Mauritius material with authentic *C. jungermannioides* from Tahiti sent to him by W. A. Setchell. Until a monographic study is made of Pacific *Cheilosporum* species, the more recent opinion of Srimanobhas *et al.* is followed in this treatment.

Cheilosporum spectabile Harvey ex Grunow 1874: 41 (type locality: Tonga); Womersley and Bailey 1970: 314, pl. 26, fig. 22 (Figs 137, 157)

Fiji and Rotuma Records

Grunow 1874: 41; Chapman 1971: 169; South and Kasahara 1992: 59; N'Yeurt 1996: 411, figs 117, 124; N'Yeurt *et al.* 1996*b*: 76.

Representative Material Examined

Suva Barrier Reef (*Keats*, 8.x.1994: SUVA (USP) 1171).

Plants up to 6 cm high, pink, bushy and calcified with dichotomous branching. Intergenicular lobes 2.4–3 × 1–1.5 mm, with rounded or broadly acute apices. Lobe angle 40–41°. Main axes without a distinct tapered outline. Plants sterile.

Habitat and Remarks

Growing hanging from coral ledges on the reef rim and passes, often shaded and exposed to considerable wave action. At very exposed sites the lobes of the plants are rounded, whereas in relatively calmer locations they are noticeably more acute. This observation agrees with Womersley and Bailey's comment (1970, p. 314) that lobe shape in this (and other) species of *Cheilosporum* could be a response to the amount of exposure, crowding or other variables.

This species was distributed without a description by Harvey (1857*b*: no. 31) as *Amphiroa* (*Cheilosporum*) *spectabilis* in his Friendly Island exsiccatae.

Jania adhaerens Lamouroux 1816: 270 (type locality: 'Méditerranée?'); Price and Scott 1992: 48, fig. 12*A–C*; Abbott 1999*a*: 187, fig. 48*A*

Fiji and Rotuma Records

Garbary *et al.* 1991: 255; South and Kasahara 1992: 60; N'Yeurt 1996: 413, fig. 126; N'Yeurt *et al.* 1996*b*: 76.

Representative Material Examined

Makaluva I. (*Faloon*, 22.x.1993: SUVA (USP) 761).

Plants erect to repent, up to 10 mm high, branching at angles of more than 45°. Branches 190–200 μm in diameter, the segments 3–5 diameters long with articulations at the base of each branch and often between dichotomies. Apex of branches conical, roundish to acute. Plants sterile.

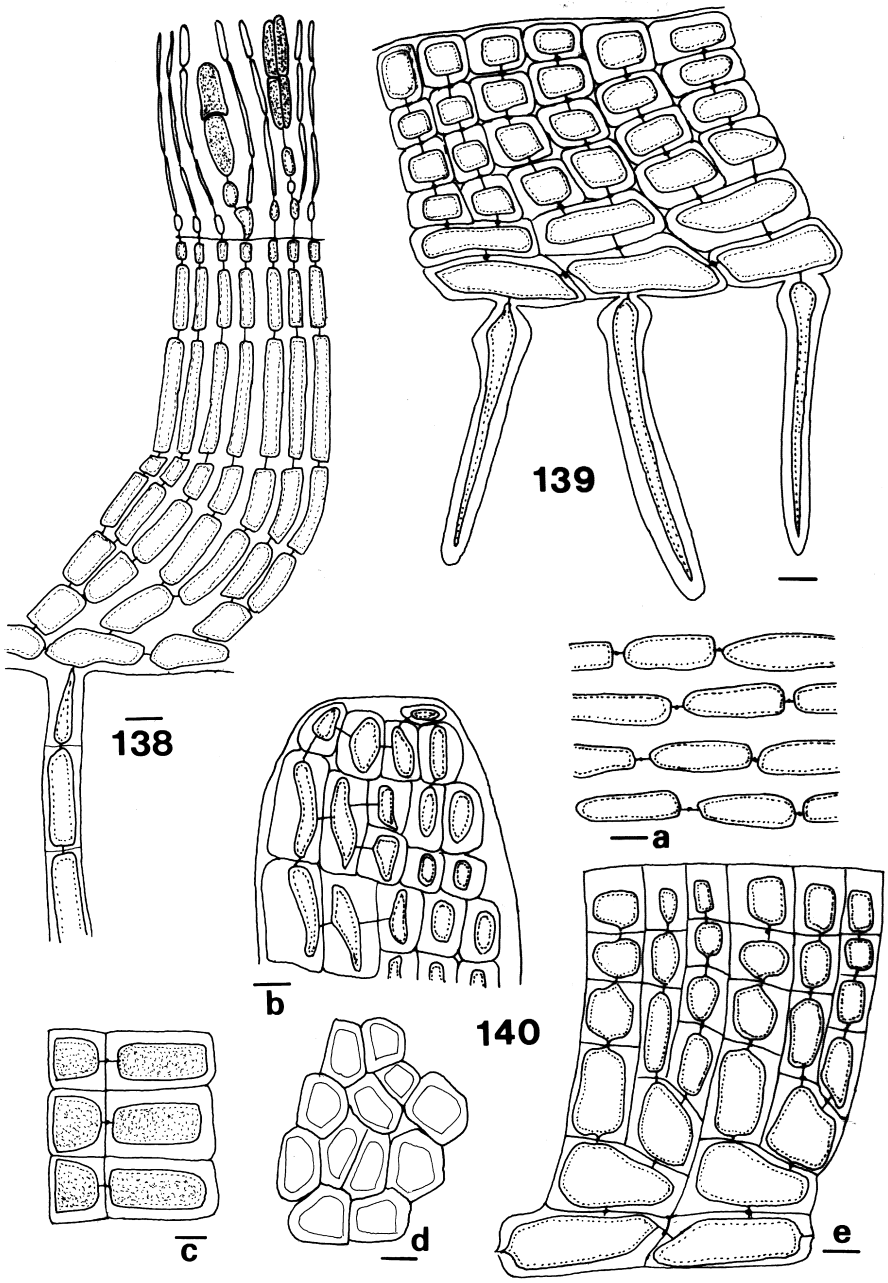


Fig. 138. *Peyssonnelia bornetii*. Cross-section of thallus, showing multicellular rhizoids and tetrasporangia (SUVA (USP) S13: 11). Scale bar = 10 µm. **Fig. 139.** *Peyssonnelia inamoena*. Cross-section of thallus, showing unicellular rhizoids (SUVA (USP) 671). Scale bar = 10 µm. **Fig. 140.** (*a*) *Peyssonnelia inamoena*. Elongate hypothallial cells (SUVA (USP) 671). Scale bar = 10 µm. (*b*) Cross-section of thallus margin showing apical cell (SUVA (USP) 671). Scale bar = 10 µm. (*c*) Thallus edge (SUVA (USP) 671). Scale bar = 10 µm. (*d*) Hexagonal perithallial cells (SUVA (USP) 671). Scale bar = 10 µm. (*e*) Cross-section of thallus showing subdivision of initial perithallial cell rows (SUVA (USP) 671). Scale bar = 10 µm.

Habitat and Remarks

Commonly found as turf in intertidal sites.

Order **Gracialirales** Fredericq et Hommersand 1989: 225
Family **Gracilariaceae** Nägeli 1847: 240, 254
Genus ***Gracilaria*** Greville 1830: 121, *nomen conservandum*

Key to the Suva Lagoon and Reef Species of *Gracilaria*

1. Thallus flattened, foliose; margins smooth or dentate 5
   Thallus terete to compressed, not foliose 2
2. Thallus repent, compressed; thick and irregularly palmate . . . . . *G. canaliculata*
   Thallus terete, erect; not palmate, thick or repent 3
3. Thallus regularly dichotomously branched; laterals absent or rare . . . . . *G. cliftonii*
   Thallus not regularly dichotomously branched, with abundant laterals 4
4. Thallus with a persistent main axis; first-order laterals alternate . . . . . *G. maramae*
   Thallus without a clear main axis; first order laterals irregularly secund . . . . . *G. edulis*
5. Blade margins smooth; apices blunt and rounded, not tapered or filiform . . . . . *G. textorii*
   Blade margins irregularly dentate; apices tapered or filiform, not rounded . . . . . *G.* sp. aff. *G. vieillardii*

Gracilaria canaliculata Sonder 1871: 56; Withell *et al.* 1994: 301, figs 16, 17 (as a form of *G. salicornia* (C.Agardh) Dawson; see Remarks below) (Figs 160, 162, 163)

Basionym and Nomenclatural Synonymy

Sphaerococcus canaliculatus Kützing 1868: 29, pl. 82, figs *d, e, nom. illeg.* (type locality: Wagap, New Caledonia).

Fiji and Rotuma Records

N'Yeurt 1997: 190.

Representative Material Examined

Suva Barrier Reef (*Keats*, 21.ix.1994: SUVA (USP) 798, 799).

Plants rubbery and tough, reddish-brown and with a metallic, gold-silver sheen. Whitish-translucent spots present on branches. Thallus repent, creeping and up to 10 cm across, with thick, flattened and broad, often tangled and anastomosing branches 3–6 mm in diameter; branch tips with a downward curve. Branching irregularly palmate to irregularly alternately branched, branches not constricted at the base. Thallus oval in cross-section; internal structure consisting of a medulla of large, thick-walled cells 82–340 µm in diameter, grading to smaller ovoid cells 15–42 µm in diameter near the cortex. Cortical cells radially compressed, 3.5–6 µm in diameter. Cystocarps large and non-constricted at the base, strongly embedded in the thallus.

Habitat and Remarks

Found growing attached to boulders, in highly exposed habitats on the spur and groove zone of the outer reef.

The Fijian material was examined by Professor H. Yamamoto and confirmed as *G. crassa* Harvey ex. J.Agardh (a species conspecific with *G. canaliculata* according to Silva *et al.* 1996).

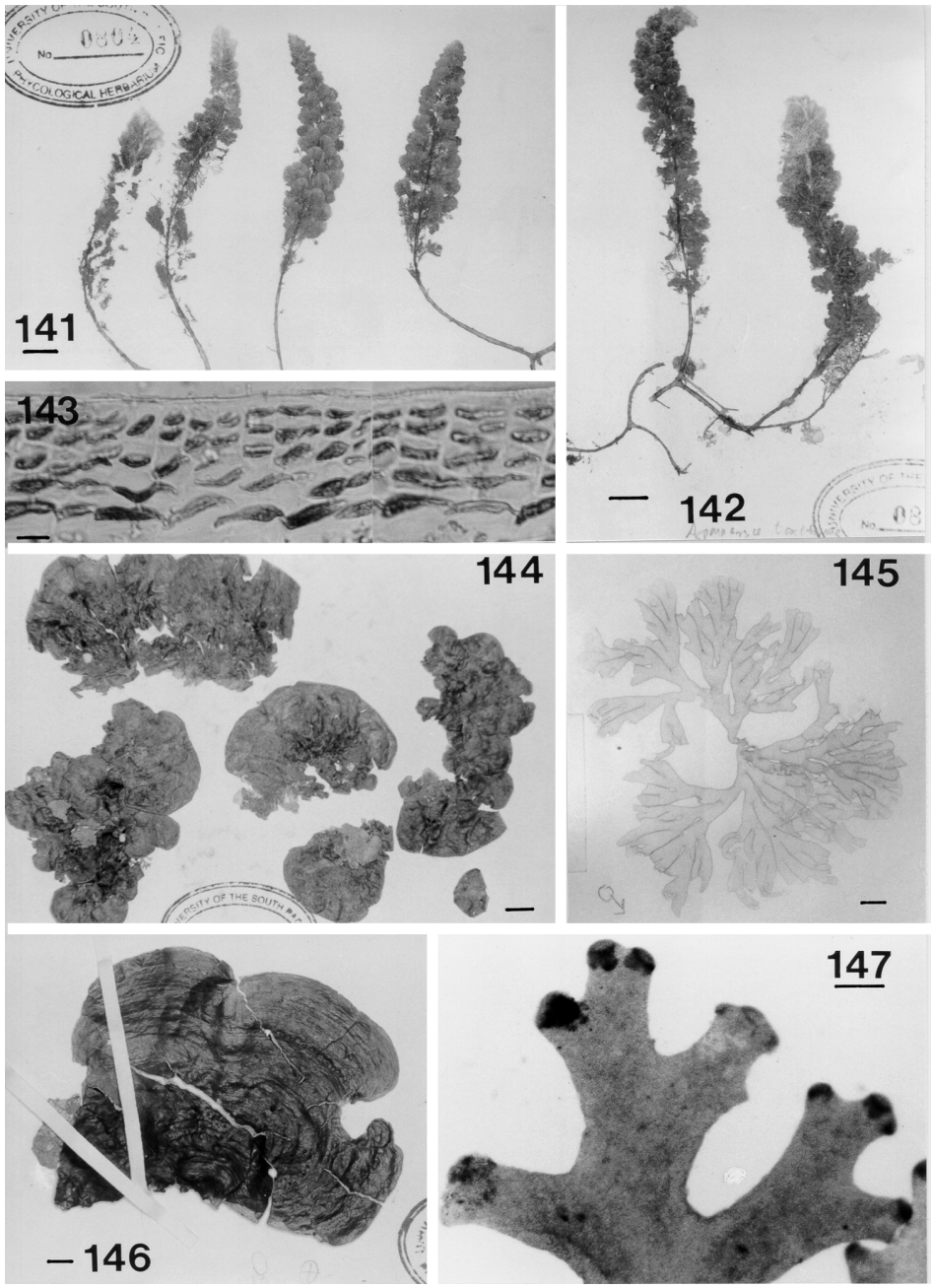


Fig. 141. *Asparagopsis taxiformis*. Habit (SUVA (USP) 803). Scale bar = 6 mm. **Fig. 142.** *Asparagopsis taxiformis*. Habit, showing creeping rhizome (SUVA (USP) 804). Scale bar = 6 mm. **Fig. 143.** *Peyssonnelia inamoena*. Cross-section of thallus showing characteristic clog-shaped hypothallial cells (SUVA (USP) 671). Scale bar = 10 µm. **Fig. 144.** *Peyssonnelia inamoena*. Habit (SUVA (USP) 671). Scale bar = 12 mm. **Fig. 145.** *Nemastoma dichotoma*. Habit (SUVA (USP) 1178). Scale bar = 5 mm. **Fig. 146.** *Peyssonnelia bornetii*. Habit (SUVA (USP) 701). Scale bar = 5 mm. **Fig. 147.** *Portieria hornemannii*. Ultimate branchlets showing incurved apices (SUVA (USP) S10: 9). Scale bar = 500 µm.

Gracilaria cliftonii Withell, Millar et Kraft 1994: 285–288, figs 4*A–C*, *E*, *G*, 5*A–C*, *H* (Figs 159, 164)

Basionym and Nomenclatural Synonymy

Gracilaria furcellata J.Agardh 1876: 419, *nom. illeg*. (lectotype locality: Freemantle, WA, Australia).

Fiji and Rotuma Records

Chapman 1977: 162; N'Yeurt *et al.* 1996*b*: 78 (both as *G. furcellata* Harvey).

Representative Material Examined

Suva Barrier Reef (*Carlson*, 14.i.1973: SUVA (USP) 140).

Thalli erect, 7–9 cm high, terete and regularly dichotomously branched; arising in more or less dense clusters from an encrusting holdfast; colour pale yellowish-green and becoming firm and brittle when dry. Axes 0.5–1 mm in diameter, with acute, often bifurcate apices. Structure pseudoparenchymatous, with a gradual transition from the large-celled medulla to the cortex. Medullary cells polygonal to spherical, 50–120 µm in diameter. Cortex 3–5 cells thick, with densely staining, mostly elongate cells 12–22 µm in diameter. Outermost cortical cells ovoid to elongate, 6–7 µm in diameter. Ellipsoid to obovoid hair basal cells 14–16 × 28–31 µm, common in outer cortex. Plants sterile.

Habitat and Remarks

Growing attached to rock, at a depth of about 60 cm in a pool beyond Sandbank, Nucubuco Pass. The Fijian plants appear to be the first records outside of Australia for this species, which is possibly widely distributed in the south-western Pacific.

Gracilaria edulis (S.Gmelin) P.C.Silva 1952*a*: 293; Yamamoto 1978: 132, pl. 30, figs 4–6; pl. 31; pl. 49, fig. 1 (Figs 161, 167)

Basionym and Nomenclatural Synonymy

Fucus edulis S.Gmelin 1768: 113, 114 (type locality: 'India orientalis').

Fiji and Rotuma Records

Grunow 1874: 42; Askenasy 1888, Chapman 1971: 169; South and Kasahara 1992 (all four as *G. lichenoides*); N'Yeurt *et al.* 1996*b*: 78.

Representative Material Examined

Suva Point (*Ehny*, 9.ix.1997: SUVA (USP) 1152; *N'Yeurt*, 11.ix.1997: SUVA (USP) 1149; USP 1150, *cystocarpic*; USP 1151, *tetrasporic*); Serua I. (*Pickering*, 27.viii.1996: *in Herb.* USP; *tetrasporic and cystocarpic*); Kaba Peninsula (*Pickering*, 2.ii.1995: SUVA (USP) 896, 897, 898, *spermatangial*, *cystocarpic and tetrasporic*).

Thallus 3–15 cm tall, erect and terete, arising from a discoid holdfast. Branching irregularly subdichotomous, with alternate or secund laterals; third-order laterals rare. Axes 0.5–1.2 mm in diameter, with acute, sometimes bifurcate apices. Colour reddish-brown, flexible when dry. Structure pseudoparenchymatous, with an abrupt transition from a medulla of large polygonal cells 40–50 µm in diameter to a 1- or 2-layered cortex of ovoid to slightly elongated cells 10–30 µm in diameter; outermost cells subrectangular to obovoid, 6–9 µm in diameter. Cystocarps protuberant, abundant on main axis and first order laterals of fertile thalli. Tetrasporangia ovoid and cruciately divided; 25–37 µm in diameter,

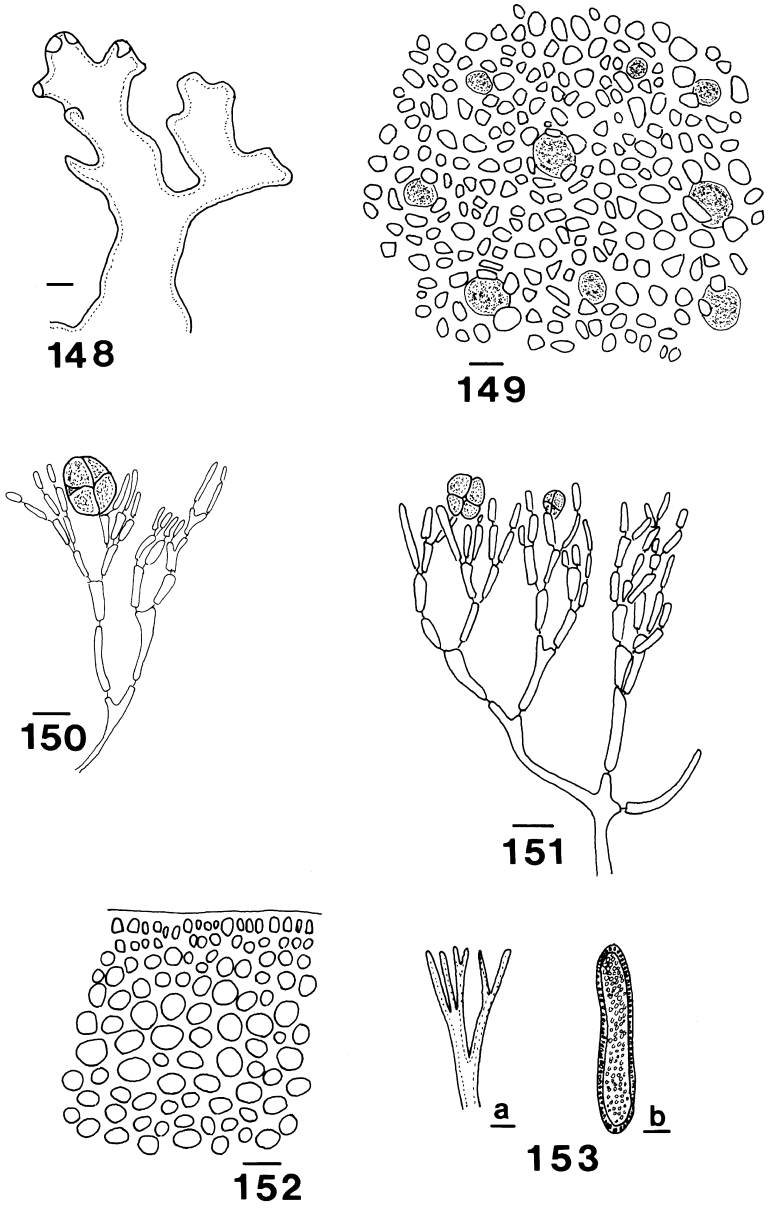


Fig. 148. *Portieria hornemannii*. Ultimate branchlets showing incurved apices (SUVA (USP) S10: 9). Scale bar = 200 µm. **Fig. 149.** *Portieria hornemannii*. Surface of thallus showing abundant gland cells (SUVA (USP) S10: 9). Scale bar = 10 µm. **Fig. 150, 151.** *Gibsmithia dotyi*. Cortical filaments with terminal tetrasporangia (SUVA (USP) S13: 19). Scale bar = 20 µm. **Fig. 152.** *Gelidiopsis repens*. Cross-section of thallus (SUVA (USP) 1159). Scale bar = 20 µm. **Fig. 153.** (*a*) *Gelidiopsis repens*. Habit showing palmate ultimate axes (SUVA (USP) 1159). Scale bar = 1 mm. (*b*) Cross-section of thallus showing elongate-oval shape. Scale bar = 330 µm.

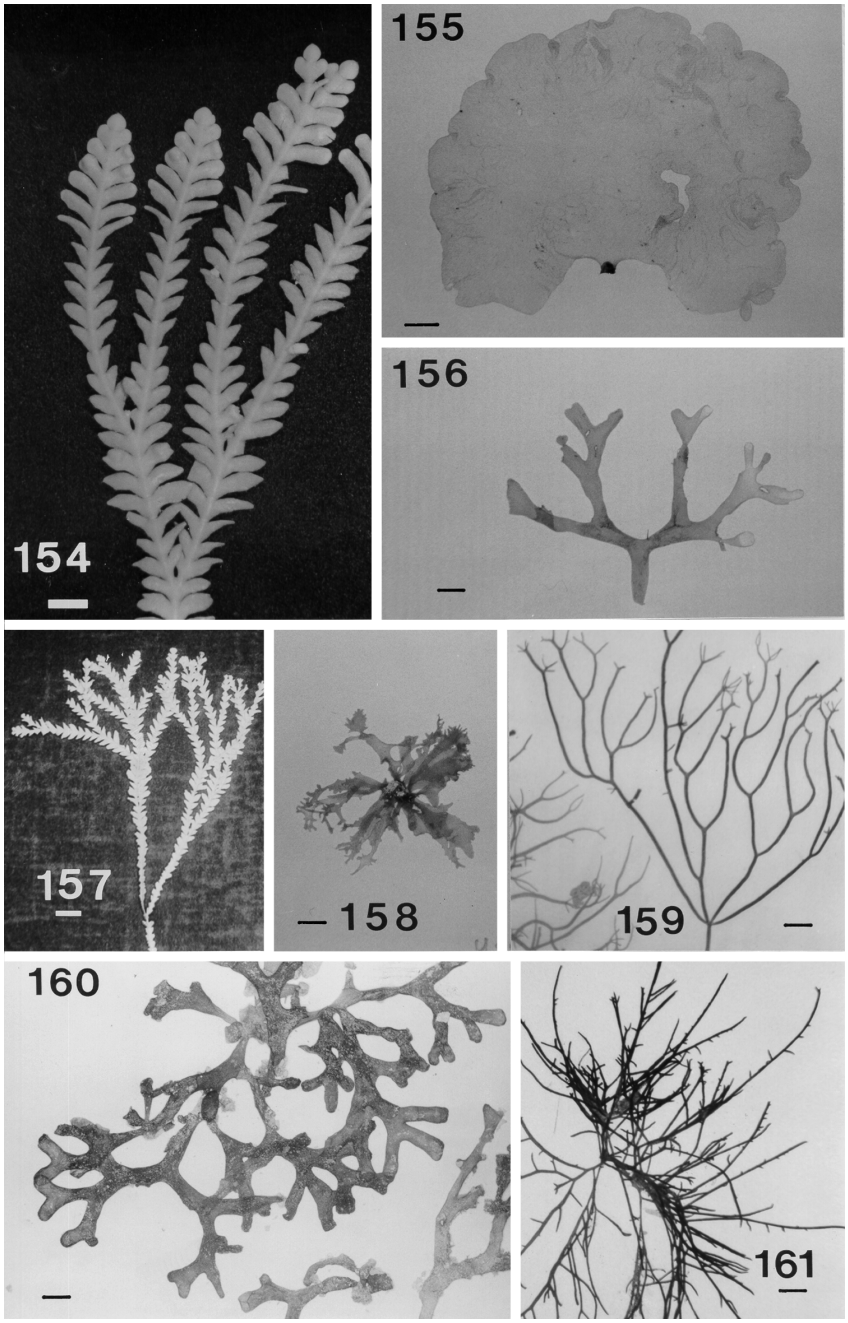


Fig. 154. *Cheilosporum acutilobum*. Habit showing conceptacles embedded in lobes (SUVA (USP) 683). Scale bar = 0.6 mm. **Fig. 155.** *Kallymenia* sp. Habit (SUVA (USP) 1182). Scale bar = 7 mm. **Fig. 156.** *Gracilaria textorii*. Habit (SUVA (USP) 1148). Scale bar = 5 mm. **Fig. 157.** *Cheilosporum spectabile*. Habit (SUVA (USP) 1171). Scale bar = 5 mm. **Fig. 158.** *Gracilaria* sp. aff. *G. vieillardii*. Habit (SUVA (USP) 1156). Scale bar = 5 mm. **Fig. 159.** *Gracilaria cliftonii*. Habit (SUVA (USP) 140). Scale bar = 5 mm. **Fig. 160.** *Gracilaria canaliculata*. Habit of dried, pressed material (SUVA (USP) 798). Scale bar = 5 mm. **Fig. 161.** *Gracilaria edulis*. Habit of dried, pressed tetrasporophyte (SUVA (USP) 1151). Scale bar = 5 mm.

scattered in outer cortex and surrounded by simple cortical involucres. Spermatangia not seen in the Suva material, but seen in deep, pot-like conceptacles in Japanese members of the species (Yamamoto 1978) and specimens from Kaba Peninsula in the South Pacific Regional Herbarium (USP 896). The tetrasporophytes are relatively smaller and darker in colour than the female thalli.

Habitat and Remarks

Common intertidally, in small tide pools on the marl at Suva Point.

This species has a potential economic value as an agarophyte (Falshaw *et al.* 1999). There is wide disagreement on the characterisation of this species, with certain workers maintaining that *G. edulis* is a distinct entity not occuring in the South Pacific (G. R. South, pers. comm.). However, the Fijian material (including spermatangial plants from Kaba Peninsula) was thought to belong to that species by Professor H. Yamamoto (pers. comm.). Further critical studies, especially on spermatangial plants, are required to ascertain the status of the Suva material.

Gracilaria maramae South 1995: 177, figs 1–14 (type locality: Suva, Fiji)

Fiji and Rotuma Records

Grunow 1874: 42; Chapman 1971: 169 (both as *G. verrucosa* (Hudson) Papenfuss; South 1995: 177, figs 1–14; N'Yeurt *et al.* 1996*b*: 78.

Representative Material Examined

Nucubuco Passage, Laucala Bay (*Carlson*, 14.i.1973: SUVA (USP) 141, 142); Suva Barrier Reef (*South*, 26.ix.1992: SUVA (USP) 574; 14.xi.1992: SUVA (USP) 575, *cystocarpic*; 6.iii.1993: SUVA (USP) 610, *cystocarpic*, USP 611, *spermatangial*; 13.iii.1993: SUVA (USP) 576); ex. Suva Market (*South*, 19.vi.1993: SUVA (USP) 606 (holotype, *cystocarpic*), USP 607, *tetrasporic*; USP 608, *spermatangial*).

Thallus 25–60 cm high, succulent and erect from a small discoidal holdfast. Branches flagelliform, 1–2.5 mm in diameter, with persistent main axis at least in lower parts of thallus. First-order branches alternately branched, with second-order branches mainly secund, with abaxial unilateral branches; branches terminally attenuated. Medulla pseudoparenchymatous, with large cells 250–480 µm in diameter, transiting abruptly to an outer medulla and cortex consisting of 2–4 layers of ovoid cells 10–13 × 7–8 µm. Mature cystocarps conical and protuberant, up to 800 µm wide and 600 µm high; not beaked. Pericarp 6- or 7-layered, 130–200 µm thick with outermost rounded to ovoid pigmented cells and innermost progressively larger cells with stellate chloroplasts. Gonimoblast lacking a persistent fusion cell, with numerous upper and fewer basal tubular nutritive filaments. Upper filaments connecting and fusing with innermost 2 layers of pericarp. Verrucosa-type spermatangial conceptacles scattered in outer cortex, 27–38 µm in diameter and up to 50 µm deep; separated and not merged. Tetrasporangia regularly cruciate, 30–37 × 25–30 µm, with elongate cortical involucres. Hair basal cells common in cortex of tetrasporophyte.

Habitat and Remarks

Growing in the upper subtidal to lower intertidal area at Suva Point and Nasese.

Gracilaria textorii (Suringar) De Toni 1895: 27; Yamamoto 1978: 123, pls 12–14; pl. 42, figs 5–7; pl. 43, figs 1–4 (Figs 156, 168)

Basionym and Nomenclatural Synonymy

Sphaerococcus textorii Suringar 1867: 259 (type locality: Japan).

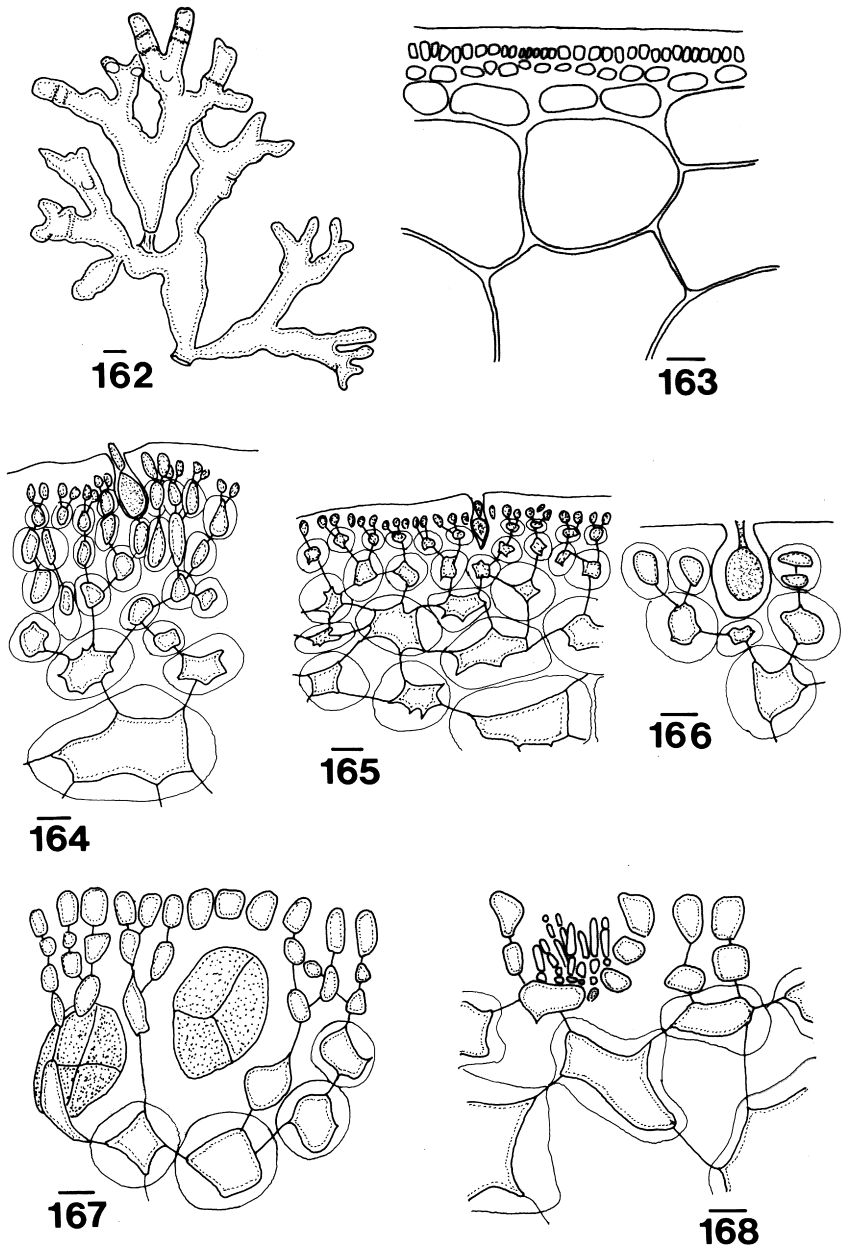


Fig. 162. *Gracilaria canaliculata*. Habit of liquid-preserved cystocarpic thallus (SUVA (USP) 798). Scale bar = 5 mm. **Fig. 163.** *Gracilaria canaliculata*. Cross-section of thallus (SUVA (USP) 798). Scale bar = 20 µm. **Fig. 164.** *Gracilaria cliftonii*. Cross-section of thallus, showing hair basal cell (SUVA (USP) 140). Scale bar = 20 µm. **Fig. 165.** *Gracilaria* sp. aff. *G. vieillardii*. Cross-section of thallus (SUVA (USP) S14: 5). Scale bar = 20 µm. **Fig. 166.** *Gracilaria* sp. aff. *G. vieillardii*. Detail of hair basal cell (SUVA (USP) S14: 5). Scale bar = 20 µm. **Fig. 167.** *Gracilaria edulis*. Cross-section of cortex with tetrasporangia. Note simple cortical involucres (SUVA (USP) 1151). Scale bar = 10 µm. **Fig. 168.** *Gracilaria textorii*. Cross-section of cortex, showing shallow spermatangial conceptacle (SUVA (USP) 1148). Scale bar = 10 µm.

Fiji and Rotuma Records

N'Yeurt 1996: 415; N'Yeurt *et al.* 1996*b*: 79.

Representative Material Examined

Belcher Rocks, Suva Reef (*Keats*, 27.xi.1994: SUVA (USP) 1148, *spermatangial*).

Thallus stipitate, 25–30 mm high, foliose and decumbent, consisting of irregularly dichotomously branched blades 2–3 mm wide with rounded apices and smooth margins. Structure pseudoparenchymatous, with abrupt transition from medulla to cortex. Medullary cells ovate to ovoid, 80–125 µm in diameter; cortex distromatic, the outermost layer of pyriform to spherical cells 8–12 µm in diameter, the inner layer of ovate to spherical cells 30–50 µm in diameter. Spermatangia in shallow, slightly raised cup-like conceptacles 25–30 µm deep that are sometimes confluent; spermatangia 2–3 µm in diameter. Cystocarps and tetrasporangia not seen.

Habitat and Remarks

Growing at a depth of 15–20 m on coral rubble. The spermatangial cavities and vegetative structure are in good accord with this species as described by Yamamoto (1978).

Gracilaria cf. ***vieillardii*** P.C.Silva in Silva *et al.* 1987: 44; Withell *et al.* 1994: 307, figs 22–24 (as *G.* cf. *vieillardii*) (Figs 158, 165, 166)

Basionym and Nomenclatural Synonymy

Sphaerococcus denticulatus Kützing 1869: 19, pl. 51, figs *e–g* (type locality: New Caledonia).

Fiji and Rotuma Records

N'Yeurt 1997: 197.

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 27.xi.1994: SUVA (USP) 1156; S14: 5).

Thallus foliose, 1–25 mm high, with 6 or 7 irregularly divided blades 2–8 mm × 600–610 µm arising from a broad basal discoidal holdfast. Stipe inconspicuous, 2–3 × 0.5 mm; blades with obtuse to filiform apices and many small spines 46–400 × 12–400 µm on the fimbriate margins. Structure pseudoparenchymatous, with an abrupt transition from medulla to cortex. Medulla 4 or 5 cells thick, composed of polygonal to spherical lightly staining cells 100–214 µm in diameter with cell walls 3–5 µm thick. Inner cortical cells ovoid to spherical, 42–78 µm in diameter, with numerous secondary pit connections. Outer cortical cells cuboidal to subrectangular, 5–9 × 5–12 µm. Darkly staining hair basal cells common in outer cortex, 15–16 × 9–11 µm. Reproduction not seen.

Habitat and Remarks

Growing on rock, at a depth of 15–20 m. The Fijian plants do not have a prominent stipe as for the Australian species described by Withell *et al.* (1994), but are in good agreement with Weber-van Bosse's (1928) description of material from nearby New Caledonia and Java. From a biogeographic point of view, it would seem likely that the Fijian material is similar to the New Caledonian species. Indeed, Weber-van Bosse's fig. 175 (p. 432) of *G. denticulata* (from Java) is similar in size and morphology to the Fijian plants and also lacks a prominent stipe (the latter being a species-specific character according to Withell

et al. 1994). After comparing the type specimen of *Sphaerococcus denticulatus* Kützing from New Caledonia with her Javanese material, Weber-van Bosse was of the opinion that they represent the same species.

The Australian *G.* cf. *vieillardii* (Withell *et al.* 1994, fig. 22*b*) and Japanese *G. denticulata* (Kützing) Weber-van Bosse (Yamada 1938*b*, p. 125, pl. XXV, fig. 2; Chihara 1975, p. 137; Yamamoto 1978, p. 126, pls 20–22, pl. 45, figs 1–5) both have a prominent stipe up to 3 cm long and shallow *textorii*-type spermatangial conceptacles and could represent the same entity, although hair basal cells are not reported in the Australian plants but occur in the Japanese (and Fijian) plants. The African records of *G. denticulata* Schmitz ex Mazza (Isaac 1957, p. 97, pl. XXXI) lack a prominent stipe but are of a much larger size than the Fijian, New Caledonian and Javanese material and also lack the abundant small marginal teeth of the tropical plants.

Børgesen (1943, p. 75) was of the opinion that Weber-van Bosse's Javanese plant was a form of *Gracilaria millardetii* (Montagne) J.Agardh and his figs 36–38 (pp. 72, 73) are vegetatively close to the Fijian material, although his other figures show a larger, more narrowly lobed and less dentate plant. However, *G. millardetii* differs from the Japanese *G. denticulata* and Australian *G. vieillardii* by having deep, *verrucosa*-type spermatangial conceptacles (Børgesen 1950, p. 35, fig. 17*a, b*; Rao 1972, p. 689, fig. 4*e*). Since information on the spermatangial conceptacle morphology of the New Caledonian, Fijian and African plants is lacking, a definite conclusion cannot be made about their identity at this time.

Order **Bonnemaisonialis** J.Feldmann et G.Feldmann 1943: 163
Family **Bonnemaisoniaceae** Schmitz in Engler 1892: 20
Genus ***Asparagopsis*** Montagne 1841: xv

Asparagopsis taxiformis (Delile) Trevisan 1845: 45; Dawson 1957: 112, fig. 20; Womersley 1996: 331, pl. 2, fig. 4; fig. 148; Abbott 1999*a*: 174, fig. 43*A–D* (Figs 141, 142)

Basionym and Nomenclatural Synonymy

Fucus taxiformis Delile 1813–1826: 295, 296, pl. 57, fig. 2 (type locality: Alexandria, Egypt).

Fiji and Rotuma Records

Chapman 1977: 162; Garbary *et al.* 1991: 255 (as *Falkenbergia hillebrandii*); South 1991: 7; N'Yeurt *et al.* 1996*b*: 71.

Representative Material Examined

Suva Barrier Reef (*Keats*, 21.ix.1994: SUVA (USP) 803, 804).

Thallus epilithic, with a pink creeping stolon 1.5–2 mm in diameter provided with hyaline rhizoids, giving rise to several erect axes 8–10 cm high, naked for about 25–40 mm below; above bearing dense plumose laterals covered with indeterminate branchlets and unbranched determinate ramuli; colour pinkish-yellow; erect axes plumose and apically attenuated in outline. Structure uniaxial, with a small distinct apical cell and a continuous cortex up to several cells thick, originating from two periaxial cells produced from subapical cells. Axial filament prominent, with a few branched rhizoidal filaments developing upwards and downwards from periaxial cells. Determinate ramuli with 5 periaxial cells, often with a small gland cell on the inner side. Reproduction not seen.

Habitat and Remarks

Growing in the spur and groove zone of the outer reef, at a depth of 10–20 m. This alga is edible and commonly used in Hawai'i (Abbott 1988), but not reported eaten in Fiji by South (1993). It is also used in the production of antibiotics (Díaz-Piferrer 1967, p. 22).

Falkenbergia hillebrandii was considered a separate genus until shown by Chihara (1961) to be the tetrasporangial stage or sporophyte generation of *Asparagopsis taxiformis* (also see Liao 1990).

Order **Gigartinales** Schmitz in Engler 1892: 18 emend. Saunders et Kraft 1996: 696
Family **Dumontiaceae** Bory 1828: 197
Genus ***Gibsmithia*** Doty 1963: 458

Gibsmithia dotyi Kraft et Ricker in Kraft 1986*b*: 433, figs 23–43 (type locality: Phillip Rock, Lord Howe I., NSW, Australia); Abbott 1999*a*: 108, fig. 22*A–C*; Millar 1999: 504, fig. 20 (Figs 130, 150, 151)

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 78.

Representative Material Examined

Fish Patch (*Ballou and Yeo*, 19.ii.1995: SUVA (USP) 908, S13: 19, *tetrasporic*; *Brooks*, 21.iii.1996: SUVA (USP) 1149L, liquid-preserved).

Thallus arising from an extensive crustose base, consisting of an erect and simple cartilaginous stalk 5–10 × 1.5–2 mm bearing several lobed gelatinous blades 20–35 mm in diameter; colour orange-red. Blades sharply demarcated from stalk; medulla composed of nearly colourless cells interspersed with rhizoidal filaments. Cortex consisting os several layers of anticlinally orientated and pseudodichotomously branched filaments with rectilinear cells 14–40 × 4–6 µm. Fusions common between adjacent cells of medullary filaments. Tetrasporangia cruciate to decussate, 10–18 µm in diameter, sessile on cells of subcortical layers. Carpogonia and spermatia not seen.

Habitat and Remarks

Growing at a depth of 10–20 m on the outer reef wall.

Genus ***Kallymenia*** J.Agardh 1842: 98

Monographs on the genus include Womersley and Norris (1971) and Codomier (1971). At least one species occurs in Fiji.

Kallymenia sp. (Figs 155, 205*a, b*)

Fiji and Rotuma Records

New genus record for Fiji and Rotuma.

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 27.xi. 1994: SUVA (USP) 1182, *spermatangial*).

Thallus a reniform, sparsely perforate, flabellate blade 45–50 mm wide and 33–35 mm high, with a small basal stipe about 2 mm in diameter and 1.5 mm long. Colour bluish-red; texture somewhat rugose and lubricous. Structure multiaxial, with a medulla composed of

irregularly branched filaments 6–8 µm in diameter and large stellate medullary cells 21–64 µm in diameter. Cortex 2–4-layered, with larger inner cells 8–11 µm in diameter and smaller anticlinal outer cells 3–4 µm in diameter. Spermatangia 0.6–1 × 3–4 µm, scattered over outer cortex.

Habitat and Remarks

Growing at a depth of 20 m. Determination at the species level is not possible due to the absence of female and tetrasporic material, although it vegetatively resembles *Kallymenia reniformis* (Turner) J.Agardh (1842; in Codomier 1971, p. 1).

Family **Peyssonneliaceae** Denizot 1968: 86, 308
Genus ***Peyssonnelia*** Decaisne 1841: 168

There are two previous records of *Peyssonnelia* from Fiji: *P. rubra* (Greville) J.Agardh (Grunow 1874; Chapman 1971) and *P.* sp. (N'Yeurt 1996) from Rotuma I. (incorporated into *P. inamoena* Pilger in this study). The former record is not verifiable as Chapman's voucher specimens are not to be found in AKU or SUVA.

Key to the Suva Lagoon and Reef Species of *Peyssonnelia*

1. Thallus rigid, hypobasal calcification heavy; rhizoids multicellular . . . . . *P. bornetii*
   Thallus flexible, hypobasal calcification light; rhizoids unicellular . . . . . *P. inamoena*

Peyssonnelia bornetii Boudouresque et Denizot 1973 (type locality: Cap-Morgiou, France); Denizot 1968: 97, figs 83, 84 (as *Peyssonnelia inamoena* from Villefranche-sur-Mer) (Figs 138, 146)

Fiji and Rotuma Records

N'Yeurt 1997: 207.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 11.ix.1985: SUVA (USP) 700; 19.ix.1985: SUVA (USP) 702); Suva Harbour (*Kasahara*, 18.ix.1985: SUVA (USP) 701, S13: 11, *tetrasporic*).

Thallus brittle and rigid, dark brownish-red with distinct concentric lines on upper surface; lower surface whitish and heavily calcified, 5–8 cm across and up to 600 µm thick (including hypobasal calcification); edges not curling upwards when dry. Rhizoids multicellular, 8–10 µm in diameter, lightly septate and abundant, cut off distally from hypothallial cell; not bent on emergence from thallus. Hypobasal calcification layer up to 380 µm thick; thallus otherwise internally uncalcified, 120–200 µm thick; cystoliths absent. Viewed from below, hypothallial cells are elongate and in regular files; viewed from above, the perithallial cells are subhexagonal in shape and organised in radial, more or less regular rows. Hypothallial cells are clog-shaped, 22–28 × 6–10 µm, in regular files and give rise distally to a single coxal cell of similar shape forming in turn 2 or 3 files of inclined to erect elongate to subrectangular perithallial cells of dimensions 19–31 × 4–6 µm. The perithallus–hypothallus angle (see Boudouresque and Denizot 1975, p. 11) is about 55° in the lower half of the thallus. In the upper half of the thallus, the perithallial initials abruptly to gradually become vertically orientated and terminate in subrectangular to square apical cells 6–7 × 3–5 µm. Tetrasporangia are terminal on the perithallial filaments, elongate, 32–34 × 12–14 µm, cruciately divided; occurring in nemathecia interspersed with sterile multicellular paraphyses. Other reproductive stages not seen.

Habitat and Remarks

Commonly found in shallow to deep habitats on the outer reef.

This species is not readily distinguished from *Peyssonnelia rubra* (Greville) J.Agardh or *P. capensis* Montagne on external morphology, but its internal structure and especially the total lack of internal thallus calcification and cystoliths, separates it from these two species and *P. neocaledonica* Kützing. The lack of intercalary calcified cystoliths in the thallus is the most important character distinguishing *P. bornetii* from *P. rubra* (Boudouresque and Denizot 1975, p. 32); Dawson (1963*a*, p. 6) mentions an anomalous *P. rubra* var. *rubra* from the Galapagos Islands with multicellular rhizoids and no mention of cystoliths, which could be representative of *P. bornetii*. Womersley and Bailey (1970, p. 306) likewise mention a species from the Solomon Islands under *C. capensis* which 'lacks any thallus calcification' and could belong to *P. bornetii*; as could Grunow's (1874, p. 40) record of *P. rubra* from Ovalau in Fiji, Samoa and Tonga. A re-examination of *Peyssonnelia* records from the region based on recent taxonomical criteria is thus desirable, to clarify the species distribution of this genus.

Peyssonnelia inamoena Pilger 1911: 311, figs 24, 25 (type locality: Gross-Batanga, Cameroon, West Africa); Denizot 1968: 97, figs 78–82; Womersley 1994: 164, figs 47*I–O*; Abbott 1999*a*: 156, fig. 38*B* (Figs 139, 140 *a–e*, 143, 144)

Fiji and Rotuma Records

N'Yeurt 1996: 411, figs 116, 122, 123 (as *Peyssonnelia* sp.).

Representative Material Examined

Fish Patch (*Keats*, 10.v.1994: SUVA (USP) 671; 18.v.1994: SUVA (USP) 718; 5.viii.1994: SUVA (USP) 782; S13: 7); off Bau I., Viti Levu (*Kasahara*, 26.x.1985: SUVA (USP) 1068); Rotuma I. (*N'Yeurt*, 10.iii.1992: SUVA (USP) 450; 22.xii.1992: SUVA (USP) 449, S13: 12).

Thallus prostrate and weakly attached to substratum, crustose and dorsiventral; colour deep red-pink; shape subcircular, 25–45 mm in diameter. Texture papery and thin; glabrous with faint concentric lines; uncalcified except on lower surface; edges tending to curl in upwards when dried. Diameter of thallus 87–88 µm in middle portion, 74–75 µm at a distance of 75 µm from thallus margin, tapering to 44 µm at thallus edge. Growth by division of oblong marginal initial cells of dimensions about 6 × 12 µm which give rise directly to a 1-layered basal layer or hypothallus composed of a coalescence of branched creeping filaments. Each rectangular to characteristically clog-shaped hypothallial cell of dimensions 12–14 × 31–37 µm gives rise centrally to a single coxal cell of similar shape measuring 10–14 × 33–34 µm forming in turn two files of upwardly inclined to erect square to subrectangular perithallial cells of dimensions 12–13 × 18–19 µm. One of the initial perithallial cells often divides again into 2 files. Unicellular pigmented rhizoids 9–12 × 70–118 µm are cut off basally and singly from nearly every hypothallial cell; a thin hypobasal layer of aragonite calcification 7–8 µm wide occurs between the rhizoids, which do not emerge bent or at an angle. The perithallus–hypothallus angle (see Boudouresque and Denizot 1975, p. 11) is about 70° in mid-thallus. Viewed from the dorsal surface, the apical cells of the perithallus are irregularly hexagonal in shape, 14–16 µm in diameter and arranged in a loosely radial pattern. Viewed ventrally, the hypothallial cells are elongate and connected in regular files, measuring about 9–10 × 31–34 µm. Marginal cells are squarish, about 16 × 18 µm. Reproduction not seen.

Habitat and Remarks

Loosely attached to coralline and rocky substratum at depths of 5–10 m on the outer reef slope. The weak adherence, thinness of the thallus and deep pinkish colour (preserved in drying) help to identify this very common species in the field.

Boudouresque and Denizot (1975, p. 59) report that the perithallial cells of Mediterranean *P. inamoena* do not lose the ability to divide further: this feature has been commonly observed in Rotuman (USP 449) and Fijian *P. inamoena*, where one of the two perithallial cells above the coxal cell divides again into two files. *Peyssonnelia crispata* (Boudouresque and Denizot 1975, p. 42, figs 66–77; Marcot *et al.* 1976: 245, fig. VII*a–e*) also superficially resembles the Fijian species, but the former has a very thick hypobasal calcification layer (making it rigid) and squarish hypothallial cells, which distinguishes it from *P. inamoena*.

Family **Rhizophyllidaceae** Schmitz 1892: 22
Genus ***Portieria*** Zanardini 1851: 33

Previously known as *Chondrococcus* (Kützing 1847: 23) and *Desmia* (Lyngbye 1819 emend. J.Agardh 1852), the taxonomy and nomenclature of this genus was discussed in detail by Silva *et al.* (1987: 128, 129; 1996: 217).

Portieria hornemannii (Lyngbye) P.C.Silva in Silva *et al.* 1987: 39, 129; 1996: 215; Millar 1990: 359, fig. 20*A, B*; Verheij and Prud'homme van Reine 1993: 192, pl. 17, fig. 8; Abbott 1999*a*: 127, fig. 29*A–D* (Figs 147–149)

Basionym and Nomenclatural Synonymy

Desmia hornemannii Lyngbye 1819: 35, pl. 7*C* ('*hornemanni*') (type locality: probably Red Sea *fide* Silva *et al.* 1996: 215).

Fiji and Rotuma Records

Grunow 1874: 44 (as *Portieria cincinnata* var. *pulvinata*); Chapman 1971: 169 (as *Chondrococcus hornemannii*); Kasahara 1985: 53, pl. 9, fig. 3, pl. 15, fig. *E* (as *Chondrococcus hornemannii*); South 1991: 8; N'Yeurt *et al.* 1996*b*: 77.

Representative Material Examined

Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) S10: 9).

Thallus up to 6 cm high, consisting of several flattened axes attached by discoid holdfasts. Axes 0.6–1.5 mm wide and 0.4–0.5 mm thick, alternately to subdichotomously or pinnately branched in a single plane up to 7 orders; ultimate branches slightly tapered with strongly incurved apices. Simple teeth sparsely occurring on laterals. Structure pseudoparenchymatous, with a large-celled clear medulla and 2- or 3-layered cortex composed of small strongly pigmented cells, with an abrupt transition from medulla to cortex. Medullary cells 90–200 µm in diameter, cortical cells 9–10 µm in diameter; spherical to ovoid yellowish gland cells up to 30 µm in diameter are abundantly scattered beneath the surface of the thallus. In surface view, gland cells are located in depressions distinctly surrounded by a ring of cortical cells. Reproduction not seen, but reported by Kasahara (1985) from Suva specimens collected in 1982 which were not deposited in SUVA and whose present whereabouts are unknown.

Habitat and Remarks

Growing on coralline substratum at a depth of 15–20 m. This alga has a distinctively strong odour when fresh, which may act as a chemical deterrent to herbivores. The abundant gland cells present throughout the thallus may play a role in this defence mechanism.

Family **Hypneaceae** J.Agardh 1851: viii, 430
Genus ***Hypnea*** Lamouroux 1813: 131

There are eight species of *Hypnea* reported from Fiji (N'Yeurt *et al.* 1996*b*, p. 79); however, the genus is in need of taxonomic revision and some of the common edible Fijian species appear to represent undescribed taxa (G. R. South, pers. comm.). The following common species is easily recognisable based on current taxonomic criteria. Further research on the local flora is expected to clarify the status of this and other reported species, but is beyond the scope of the present work.

Hypnea pannosa J.Agardh 1847: 14 (type locality: San Agustín, Oaxaca, Mexico); Price and Scott 1992: 38; Abbott 1999*a*: 117, fig. 25*A*

Taxonomic Synonymy (fide *Dawson 1961, Womersley and Bailey 1970*)

Hypnea nidulans Setchell 1924: 161, fig. 30 (type locality: Tutuila I., American Samoa); Dawson 1954: 438, fig. 46*e–g*.

Fiji and Rotuma Records

Kasahara 1985: 62; N'Yeurt 1996: 415, fig. 136; N'Yeurt *et al.* 1996*b*: 79 (latter two as *H. nidulans*).

Representative Material Examined

Suva Point (*South*, 18.xi.1990: SUVA (USP) 630, cystocarpic; Makaluva I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 303); Suva Lagoon (*South*, 2.xi. 1991: SUVA (USP) 572, tetrasporangial).

Thallus purple-pink, up to 2 cm high, with mostly terete axes up to 1 mm broad. Branching irregular, with arcuate tendency for the axis and branches. Branches not constricted at the base, terminating in sharply acute apices. Medulla up to 740 µm in diameter, consisting of a central axial cell giving way radially to medullary cells up to 200 µm in diameter. Lenticular thickenings present in some medullary cells. Inner cortical cells 23–30 µm in diameter; pigmented epidermal cells 8–9 µm in diameter. Apical cell single, prominent, up to 10 µm in diameter. Cystocarps globose, 1–3 per side-branchlet. Tetrasporangia zonate, in tetrasporangial stichidia that usually encircle the side-branchlets but are also sometimes saddle-shaped or unilateral (on the same branch of the same plant).

Habitat and Remarks

The Suva Lagoon plants closely resemble *H. nidulans* Setchell as described by Tanaka (1941, p. 246) who considered that *H. pannosa* has smallar, densely entangled thalli and encircling tetrasporangial sori, whereas *H. nidulans* has larger, loosely entangled thalli and saddle-shaped tetrasporangial sori; with frequent lenticular thickenings in medullary cells. Dawson (1961) remarked that the unilateral versus radial tetrasporangial stichidia in *H. pannosa*-like plants from Pacific Mexico were very variable and that the latter character was not reliable to separate *H. nidulans* from *H. pannosa*; this was also found to be the case in the Suva material examined. Womersley and Bailey (1970) compared the type species of

H. nidulans and *H. pannosa* with Solomon material and found that a single species was present (*H. pannosa*). On the other hand, preliminary molecular studies indicate that Japanese *H. pannosa* and *H. nidulans* plants may be separate entities, while *H. nidulans*-like plants with consistently saddle-shaped tetrasporangial sori were found in Malaysia (Y. Yamagishi, pers. comm.). Further (possibly molecular) studies are clearly required to clarify the taxonomy of the *H. pannosa–H. nidulans* complex in the region.

Family **Nemastomataceae** Schmitz 1892: 22, *nomen conservandum*
Genus ***Nemastoma*** J.Agardh 1842: 89

Nemastoma dichotoma J.Agardh 1842: 91 (type locality: Trieste, Italy); Ardré 1980: 124, 125, pl. 7, figs 64, 68, 69 (Figs 145, 174)

Fiji and Rotuma Records

N'Yeurt 1997: 216.

Representative Material Examined

Suva Barrier Reef (*Keats*, 8.x.1994: SUVA (USP) 1178, S14: 13, 15, *spermatangial*).

Thallus 3–5 cm high, erect from a small discoid holdfast. Structure gelatinous but firm, with subterete regularly dichotomous branches 2–5 mm wide, broadened below dichotomies. Structure multiaxial, with a medulla of entwined, sparsely branched filaments 4–6 µm in diameter composed of elongate cells 20–26 µm long and a cortex of discrete subdichotomous branches composed of subspherical to ovoid or cuneate cells 1.5–3 µm in diameter; refractive gland cells not seen. Spermatangia 0.5–1.5 µm in diameter, cut off from outer cortical cells. Cystocarps and tetrasporangia not seen.

Habitat and Remarks

Growing at a depth of 30–40 m. The habit of the thallus agrees with the description by Kylin (1956) and Ardré (1980), although gland cells were not seen in the cortex. However, since the material is spermatangial no definite comparison of the female reproductive structures is possible and the assignment of this species to *Nemastoma* is hence tentative.

Genus ***Platoma*** Schousboe ex Schmitz 1894: 627 emend. Masuda et Guiry 1994
Platoma cyclocolpum (Montagne) Schmitz 1894: 627 ('*cyclocolpa*'); Ardré 1980: 125, pl. 7, figs 65–67 ('*cyclocolpa*'); Masuda and Guiry 1994: 194–201, figs 1–34 ; Huisman 1999 (Figs 169, 170–173)

Basionym and Nomenclatural Synonymy

Halymenia cyclocolpa Montagne 1841: 163 (lectotype locality: Tangier).

Synonymy (fide *Huisman* 1999)
Nemastoma damaecorne Harvey 1855: 557

Fiji and Rotuma Records

N'Yeurt 1997: 218.

Representative Material Examined

Makaluva I. (*Seeto*, 15.xii.1994: SUVA (USP) 1184, S14: 16, 17, *cystocarpic*).

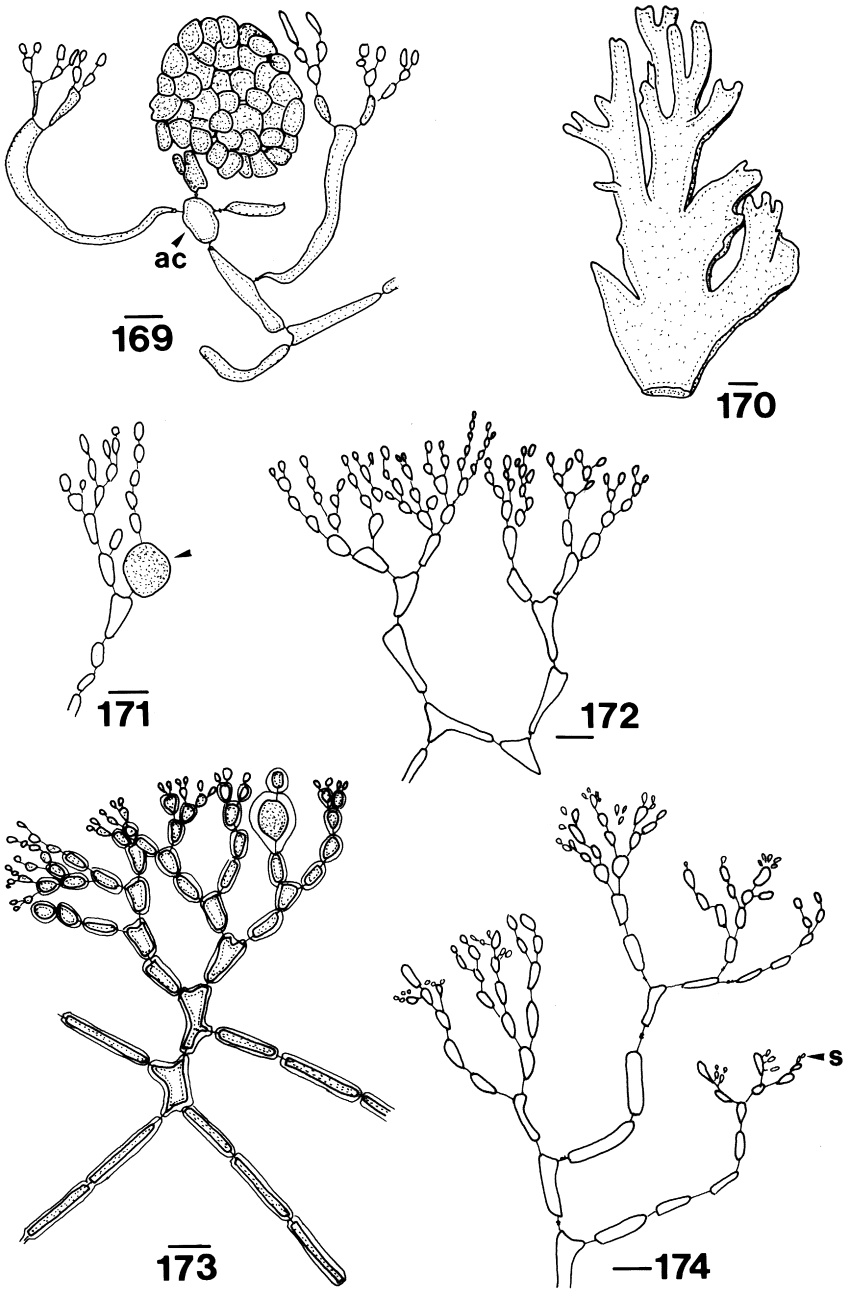


Fig. 169. *Platoma cyclocolpum*. Carposporophyte issued from columnar gonimoblast initial borne directly on auxiliary cell (arrowhead) (SUVA (USP) S14: 16). Scale bar = 20 µm. **Fig. 170.** *Platoma cyclocolpum*. Habit (SUVA (USP) 1184). Scale bar = 5 mm. **Fig. 171–173.** *Platoma cyclocolpum*. Cortical filaments showing intercalary refractive gland cells (arrowhead) (SUVA (USP) S14: 16). Scales = 20 µm. **Fig. 174.** *Nemastoma dichotoma*. Cortical filaments with terminal spermatangia (arrowhead) (SUVA (USP) S14: 13). Scale bar = 11 µm.

Thallus decumbent and compressed, up to 60 mm long, 1–2 mm thick and 40 mm wide, arising from a single discoid basal holdfast. Texture gelatinous but firm; branching irregular to pseudodichotomous with rounded bifurcate apices. Structure multiaxial, with a medulla of entwined, sparingly branched filaments composed of elongate cells 42–45 × 6.5–7 µm and a cortex of discrete subdichotomous branches composed of progressively smaller obovate to elliptical or cuneate cells 4.5–8 µm in diameter. Spherical to ovoid yellowish refractive gland cells 18–25 µm in diameter present, intercalary on cortical filaments. Carpogonial branch not seen; carposporophyte subspherical, 73–75 µm in diameter, with a columnar gonimoblast initial about 18 × 11 µm, borne directly on an auxiliary cell 15–16 µm in diameter. Carposporophyte composed entirely of carposporangia 11–12 µm in diameter; surrounded by 1 or 2 elongate, arcuate filaments issued from proximal cells of cortical fascicles on the auxiliary cell. Spermatangia and tetrasporophyte not seen.

Habitat and Remarks

Cast up on the reef from deep water following a tropical cyclone.

The Fijian material is in good agreement with the description of *P. cyclocolpum* by Masuda and Guiry (1994) and Huisman (1999). Feldmann (1942), Kraft and John (1976) and Womersley and Kraft (1994) all placed importance on the absence of gland cells in species of *Platoma*, but Ardré (1980: 125, pl. 7, figs 65–67) was the first to notice intercalary gland cells in the type specimen of *Halymenia cyclocolpa* Montagne. This observation was later confirmed by Masuda and Guiry (1994) and supported by Kraft and Abbott (1997). It is also pertinent that Segawa (1938, p. 143, pl. XXXV, fig. 5) described 'brilliantly yellowish' gland-like cells in the Japanese species *Platoma izunosimensis* Segawa, an observation which went apparently unnoticed by Kraft and John (1976, p. 336) when comparing their new species *Nemastoma confusum* (ascribed to *Platoma* by Masuda and Guiry 1994) with *P. izunosimensis*.

Genus ***Predaea*** G.De Toni 1936: (5)
Predaea weldii Kraft et Abbott 1971: 194, figs 1–15 (type locality: Kaneohe Bay, Oahu I., Hawai'i); Kraft 1984*a*: 15, figs 36–42; Abbott 1999*a*: 153, fig. 37*D–F* (Figs 183*a–c*, 228)

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 79.

Representative Material Examined

Fish Patch (*N'Yeurt*, 6.ix.1995: SUVA (USP) 1147 (*liquid-preserved, cystocarpic*); S13: 20, *cystocarpic*); Windward Reef, Great Astrolabe Reef (*Keats*, 9.vii.1994: SUVA (USP) 909, *cystocarpic*).

Plant gelatinous and erect from a broad discoidal holdfast; 20–30 × 20–25 mm, with numerous short, blunt tapering, generally vertically aligned branchlets with characteristic bright-orange tips in life. Cortex consisting of pseudodichotomously branched filaments with rectilinear cells 4–5 × 16–20 µm. Gland cells not seen. Auxiliary cells elongated and intercalary on inner cortical filaments; uteriform in shape with an apical bulge. The 3 proximal cells to the auxiliary cells produce a few sparse clusters of subspherical nutritive cells 5–7 µm in diameter. Gonimoblast initial distinct, 5–7 µm in diameter, produced by transverse division of the apex of the auxiliary cell. Mature cystocarps 114–120 µm in diameter, subspherical to obovoid, without a pericarp or fusion cell; carposporangia 7–12 µm in diameter. Spermatia and tetrasporophyte not seen.

Habitat and Remarks

Growing in small crevices and on coralline algae substratum, at 20-m depth on the outer reef wall.

Genus ***Titanophora*** (J.Agardh) J.Feldmann 1942

Key to the Suva Lagoon and Reef Species of *Titanophora*

1. Thallus flattened, with subacute excrescences on surface . . . . . *T. weberae*
   Thallus terete to compressed, without subacute excrescences on surface . . . . . *T. pikeana*

Titanophora pikeana (Dickie) J.Feldmann 1942: 111; Mshigeni and Papenfuss 1980: 786, fig. 2; R. E. Norris 1992: 5–8, figs 11–18; Abbott 1999*a*: 169, fig. 41*C* (Figs 176, 180*a*, 182*a–c*)

Basionym and Nomenclatural Synonymy

Galaxaura pikeana Dickie 1874: 195, 196 (type locality: Mauritius).

Fiji and Rotuma Records

N'Yeurt 1997: 222.

Representative Material Examined

Suva Barrier Reef (*Ballou*, 3.ii.1995: SUVA (USP) 1008, *cystocarpic*).

Thallus pinkish-white to greenish-white, moderately calcified, up to 12 cm high with deeply incised irregularly branched and terete ultimate branchlets 6–11 mm in diameter with obtuse to acute, distally broadened apices. Surface of thallus smooth, without excrescences; thallus attached to substratum via a small discoid holdfast. Internal structure consisting of a central region of branched or unbranched medullary filaments 3–6 µm in diameter and an outer cortex of radially elongated cells 6–7 × 3–4 µm. Innermost cortical cells subrectangular to oval, up to 10 µm in diameter and connected to the filaments of the medullary layer via primary pit connections. Large, oblong to globular, non-granular, yellow gland cells 40–55 µm in diameter are abundantly scattered in the cortical layer. Cystocarps scattered over the thallus surface, with a distinct single ostiole. Carpogonial branch not seen, but reportedly 3-celled with an additional tier of dark-staining cells (Bucher and Norris 1992); mature carposporophyte 50–56 µm in diameter, with sparsely and dichotomously branched calcified involucral filaments. Carpospores spherical to subrectangular, 20–25 µm in diameter. Antheridia and tetrasporangia not seen.

Habitat and Remarks

Growing at a depth of 16 m in the spur and groove zone of the outer reef passage. According to R. E. Norris (1992, p. 8), this variable species represents the only member of the genus. See note below for *Titanophora pulchra* for discussion.

Titanophora weberae Børgesen 1943: 39, fig. 13 (type locality: Sele Strait, Irian Jaya, Indonesia; type in L); Mshigeni and Papenfuss 1980: 780, figs 1, 3*B*; Verheij and Prud'homme van Reine 1993: 187, pl. 16, fig. 6; Millar 1999: 507, fig. 24; Millar *et al.* 1999: 563, fig. 3*E* (Figs 175, 177, 179, 180*b–e*)

Taxonomic Synonymy

Titanophora pulchra Dawson 1954: 433, figs 45, 46*a*, *b*. (type locality: Cau Da harbor area, Viêt Nam).

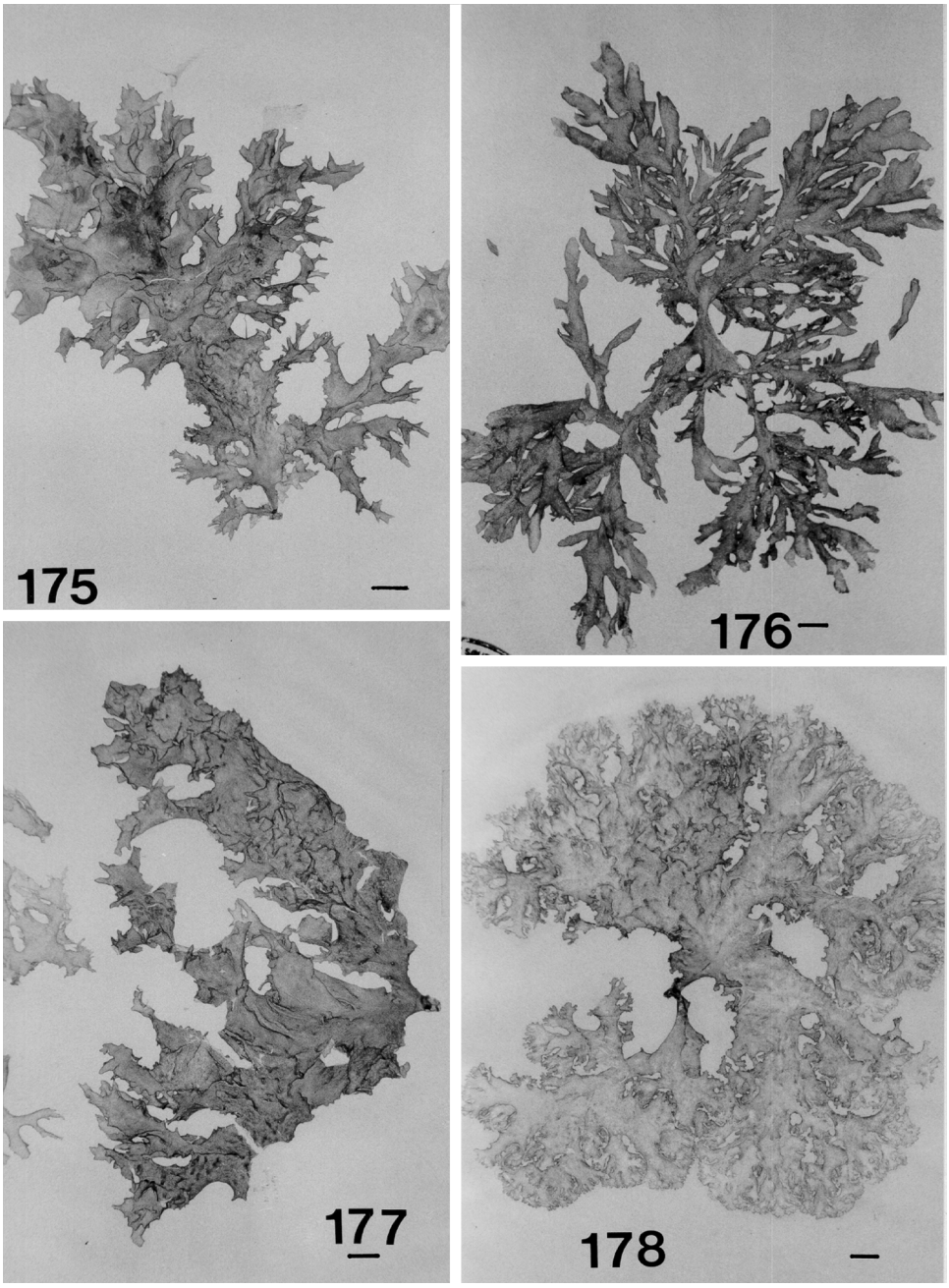


Fig. 175. *Titanophora weberae*. Habit. (SUVA(USP) 296). Scale bar = 10 mm. **Fig. 176.** *Titanophora pikeana*. Habit (SUVA (USP) 1008). Scale bar = 10 mm. **Fig. 177.** *Titanophora weberae*. Habit (SAP 62209). Scale bar = 10 mm. **Fig. 178.** *Titanophora pulchra*. Cystocarpic and antheridial. Holotype (US 57082). Scale bar = 5 mm.

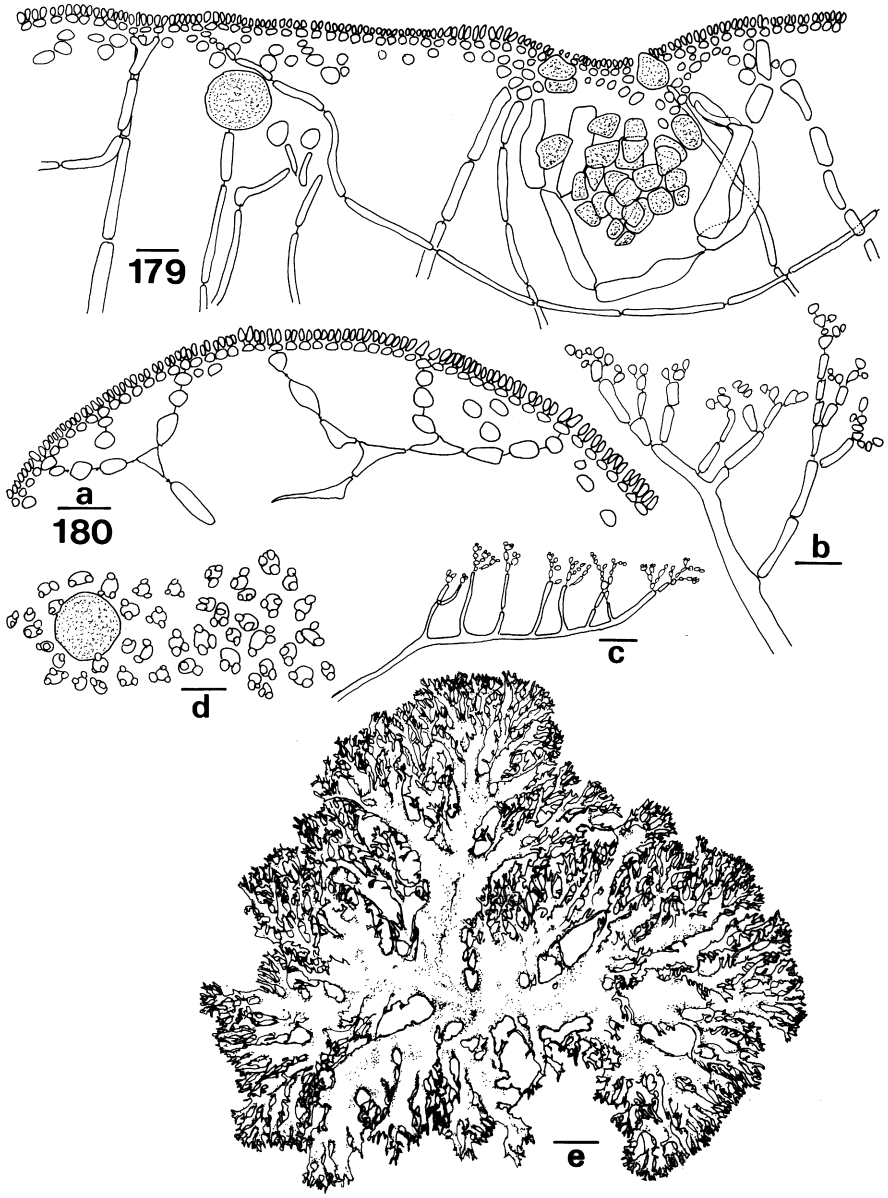


Fig. 179. *Titanophora weberae*. Cross-section of thallus showing gland cell and cystocarp. Scale bar = 20 µm. **Fig. 180.** (*a*) *Titanophora pikeana*. Cross-section of thallus (SUVA (USP) 1008). Scale bar = 20 µm. (*b*) *Titanophora weberae*. Cortical filament. Scale bar = 20 µm. (*c*) *Titanophora weberae*. Cortical filament. Scale bar = 50 µm. (*d*) *Titanophora weberae*. Surface of thallus, showing gland cell. Scale bar = 20 µm. (*e*). *Titanophora weberae*. Habit. Scale bar = 10 mm (artwork by A. Ballou).

Fiji and Rotuma Records

Kasahara 1985: 59, pl. 11, fig. 1; pl. 16, fig. *C*; South and Kasahara 1992: 62 (both records as *T.* sp. aff. *T. pulchra* Dawson; see note below); N'Yeurt *et al.* 1996*b*: 79 (as *T. weberae* Børgesen); N'Yeurt 1997: 223, figs 175, 177, 179, 180*b–e*, pl. I*a*.

Representative Material Examined

Nukulau I. (*Carlson*, 20.viii.1972: SUVA (USP) 296); Suva Barrier Reef (*Keats*, 21.ix.1994: SUVA (USP) 800; 801; 802, *cystocarpic*; 22.xii.1994: SAP 062209); Moorea I., French Polynesia (*Payri*, 1992: SUVA (USP) 1172*a*, *b*, *cystocarpic and antheridial*); Cau Da, Viêt Nam (*Dawson*, 17.iii.1953: US 57082, Holotype, *cystocarpic and antheridial*).

Thallus aplanate, up to 20 cm across, forming an expanded, mucilaginous reddish-pink to yellowish blade with a rough, skin-like texture, attached to the substratum via a small discoidal holdfast. Surface of blade with scattered subacute excrescences and a ruffled, spinulous fringe. Branching complanate, moderately lobed, with lateral or pseudo-dichotomous terminal branches. Blade 615–885 µm thick, with a moderately to strongly calcified medulla appearing whitish in cross-section. Thallus consisting of a central region of branched or unbranched medullary filaments 3–6 µm in diameter and an outer cortex of radially elongated cells of dimensions 3.5–4.3 × 6.8–10 mm. Innermost cortical cells subrectangular to oval, 7–10 µm in diameter, connected to the filaments of the medullary layer via primary pit connections. Large, oblong to globular, non-granular, yellow gland cells 16–17 µm in diameter are abundantly scattered in the cortical layer; these are intercalary between medullary filaments and cortical cells. Carpogonial branch not seen; cystocarps scattered over the thallus surface, with a distinct single ostiole. Mature carposporophyte 50–57 µm in diameter, with calcified, sparsely and dichotomously branched involucral filaments 5–10 µm in diameter. Carpospores spherical to subrectangular, 10–13 µm in diameter. Antheridia borne in pairs on cortical cells (Kasahara 1985). Tetrasporangia not seen.

Habitat and Remarks

Found growing on the outer reef slope, at 5–15-m depth, with a flattened and spinulous habit. Kasahara (1985, p. 59) remarked that the Fijian plants were similar morphologically to *T. pulchra* Dawson, but noted that the antheridia are produced in pairs on cortical cells, as opposed to singly in *T. pulchra* (unfortunately, Kasahara's specimens were not deposited in SUVA and confirmation is not possible). Dawson (1954, p. 434) justified his species as distinct from *T. weberae* Børgesen due to the apparent absence of gland cells (which are present in the Fijian material) and the elongate free cells of the outer cortical layer, as well as the more flabellate and more shortly digitate ultimate segments of his plant. His fig. 46*a* of the cortex, however, bears much resemblance to the cortical layer of the Fijian plants, as do the numerous subacute excrescences on the thallus surface in fig. 45. The presence of yellow gland cells and nature of the cystocarps of the Fijian material would seem to indicate it being *T. weberae*, but an examination of the holotype of Dawson's Vietnamese plant (#*EYD*-11444, Alg. Coll. #*US*-57082; Figs 178, 181*a–c*) showed it to contain numerous gland cells in parts of the thallus (Fig. 181*b*), as was also reported by Bucher and Norris (1992, p.188). The Holotype of *T. pulchra* also seems to have antheridia borne in pairs on at least some cortical cells (Fig. 181*c*) and the involucral filaments of the carposporophyte are similarly branched as the Fijian and Polynesian material.

A comparison of selected characters between the Fijian material, the Holotype of *T. pulchra* and *T. weberae* from French Polynesia is given in Table 2. From the data, it can be seen that the dimensions of outer cortical cells is variable and comparable among all three species; the only differences are the somewhat larger gland cells in *T. pulchra* and the scarcity of surface excrescences in the Polynesian material. However, these differences could well be environmentally induced, as is the case with the habit of the plants: a wide range of forms from finely branched and flabellate to scarcely branched and blade-like has

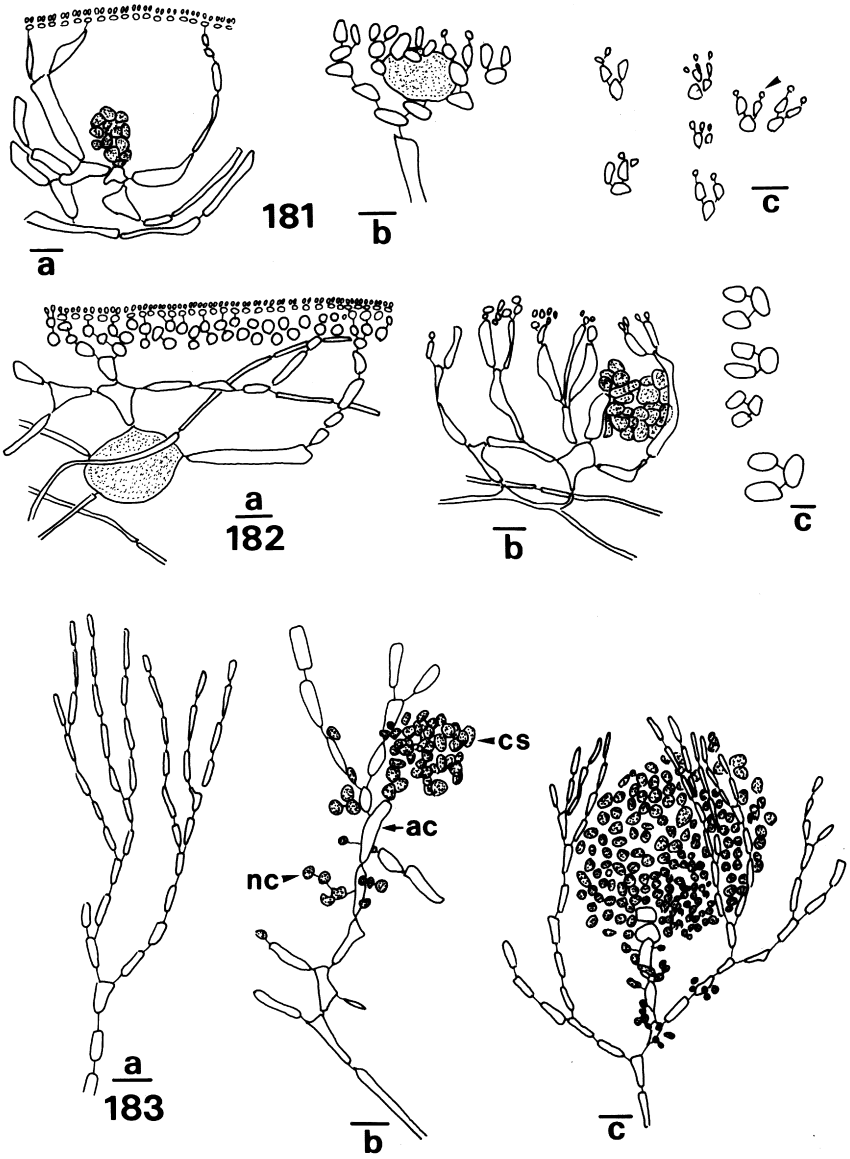


Fig. 181. (*a*) *Titanophora pulchra*. (Holotype, US 57082). Cystocarp. Scale bar = 20 µm. (*b*) Gland cell. Scale bar = 10 µm. (*c*) Cortical cells with terminal antheridia (arrowhead). Scale bar = 10 µm. **Fig. 182.** (*a*) *Titanophora pikeana* (SUVA (USP) 1008). Cross-section of thallus showing gland cell. Scale bar = 20 µm. (*b*) Cystocarp. Scale bar = 20 µm. (*c*) Outer cortical cells. Scale bar = 5 µm. **Fig. 183.** (*a*) *Predaea weldii*. Outer cortical filaments (SUVA (USP) S13: 20). Scale bar = 20 µm. (*b*) Young carposporophyte (cs) issued from elongate intercalary auxiliary cell (ac). Note globular nutritive cells (nc) in short chains on proximal cells. Scale bar = 20 µm. (*c*) Mature carposporophyte. Scale bar = 20 µm.

been observed in large collections of Fijian and Polynesian material, as well as in collections of *T. weberae* from the Philippines (Kraft *et al.* 1999).

From an examination and comparison of the Holotype of *T. pulchra* and the Suva Barrier Reef material there is little doubt that they represent the same entity, but it may not be justifiable to separate *T. pulchra* from *T. weberae* on minor morphological grounds alone

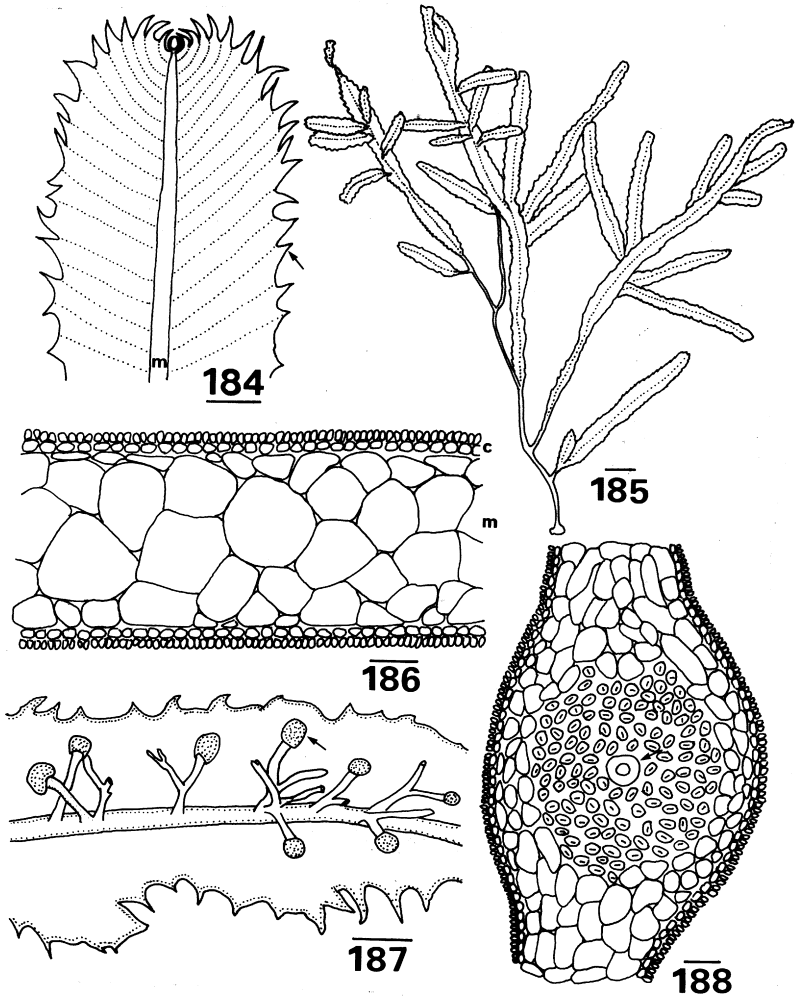


Fig. 184. *Phacelocarpus neurymenioides*. Apical region of blade, showing midrib (m) and serrations (arrow) (SUVA (USP) 694). Scale bar = 2 mm. **Fig. 185.** *Phacelocarpus neurymenioides*. General habit of thallus of Holotype (SUVA (USP) 694). Scale bar = 1 cm. **Fig. 186.** *Phacelocarpus neurymenioides*. Cross-section of distal part of blade, showing medulla (m) and cortex (c) (SUVA (USP) 840). Scale bar = 20 µm. **Fig. 187.** *Phacelocarpus neurymenioides*. Habit of fertile branch with branching, stalked tetrasporangial nemathecia (arrow) (SUVA (USP) 840). Scale bar = 3 mm. **Fig. 188.** *Phacelocarpus neurymenioides*. Cross-section of blade at the midrib, showing central axial cell (arrow) surrounded by rhizoidal mass (SUVA (USP) 694). Scale bar = 50 µm.

and the Fijian plants are consequently retained within the circumscription of the latter species pending further (possibly molecular) decisive evidence to the contrary.

According to R. E. Norris (1992, p. 8), *Titanophora* comprises a single variable species (*T. pikeana* (Dickie) J.Agardh). Masuda and Guiry (1995, p. 66), however, are of the opinion that species in the genus should not be merged without extensive studies of structure and reproduction. In view of the consistently different habit and morphological characteristics of the two Fijian *Titanophora* entities, we prefer to retain them as separate species in this treatment, pending more detailed studies.

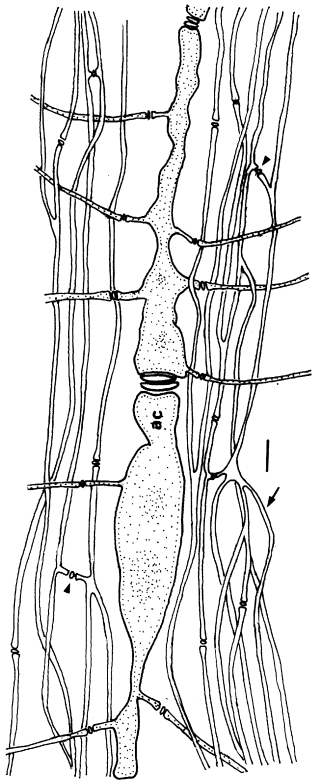


Fig. 189. *Phacelocarpus neurymenioides*. Longitudinal section of blade at the midrib, showing axial cells (ac) surrounded by rhizoidal filaments (arrow) with numerous secondary pit connections (arrowheads) (SUVA (USP) 838). Scale bar = 20 µm.

Table 2. Comparison of selected characters between Vietnamese, Fijian and Polynesian *Titanophora* species referable to *T. weberae* Børgesen

Characters	Fijian material	*T. pulchra* Dawson (holotype, *US-57082*)	*T. weberae* (Moorea Island)
Dimensions of free outer cortical cells	3.5–4.3 × 6.8–10 µm	2.5–3.1 × 6.3–10 µm	2.0–4.3 × 8.7–12 µm
Diameter of gland cells	16–17 µm; not granular	20–24 µm; not granular	15–17 µm; not granular
Surface excrescences	Present	Present	Sometimes present
Antheridia	In pairs (Kasahara 1985)	Singly or in pairs	Singly or in pairs
Involucral filaments	Dichotomously branched	Dichotomously branched	Dichotomously branched

Family **Areschougiaceae** J.Agardh 1876: 246, 273
Genus ***Callophycus*** Trevisan 1848: 107

Callophycus serratus (Harvey ex Kützing) P.C.Silva 1957: 143; Kraft 1984*b*: 54; figs 2–16, 50; Millar *et al.* 1999: 564, fig. 4*B* (Figs 219, 225*a, b*)

Basionym and Nomenclatural Synonymy

Thysanocladia serrata Harvey ex Kützing 1869: 10, pl. 29, figs *a*, *b* (type locality: Tonga).

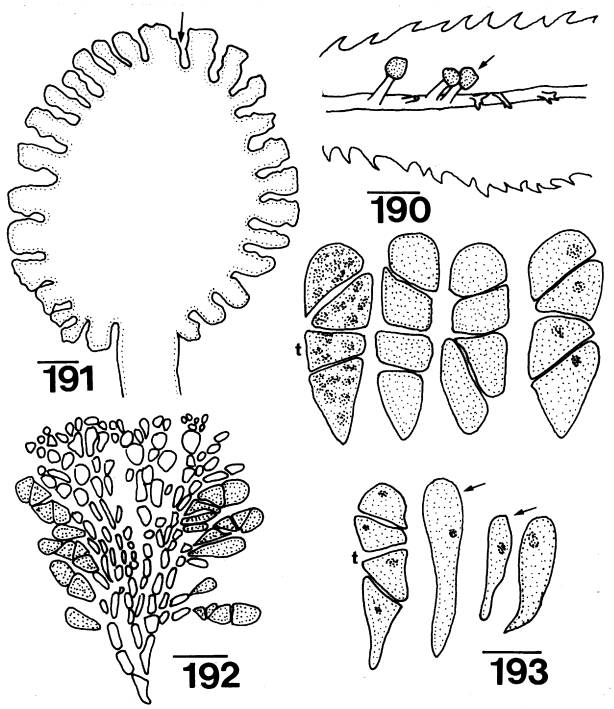


Fig. 190. *Phacelocarpus neurymenioides*. Habit of fertile branchlet with unbranched, stalked tetrasporangial nemathecia (arrow) (SUVA (USP) 694). Scale bar = 2 mm. **Fig. 191.** *Phacelocarpus neurymenioides*. Semi-diagrammatic drawing of a longitudinal section of a tetrasporangial nemathecium, showing nemathecial channels (arrow) (SUVA (USP) 840). Scale bar = 100 µm. **Fig. 192.** *Phacelocarpus neurymenioides*. Single filament from nemathecial channel, bearing tetrasporangial initials and zonate tetrasporangia (SUVA (USP) 840). Scale bar = 20 µm. **Fig. 193.** *Phacelocarpus neurymenioides*. Zonate tetrasporangia (t) and club-shaped tetrasporangial initials (arrow) (SUVA (USP) 694). Scale bar = 10 µm.

Fiji and Rotuma Records

Chapman 1971: 169 (as *Thysanocladia serrata* Harvey); Kraft 1984*b*: 57; N'Yeurt *et al.* 1996*b*: 80.

Representative Material Examined

Suva Barrier Reef (*Keats*, 21.ix.1994: SUVA (USP) 859, 878, 879; 22.ix.1994: SUVA (USP) 858, 860; 8.x.1994: SUVA (USP) 861, 862; *Ballou*, 3.ii.1995: SUVA (USP) 865, 866, *in* SAP). *All sterile*.

Other Known Suva Material

Suva Harbour Entrance, at 30-m depth (*Booth*, 20.vii.1976: MELU WB35-75, *sterile*).

Thallus distichous, dark red, erect and compressed, 6–10 cm high, arising from an irregularly discoid holdfast. Main axis 1–1.5 mm wide and 350–750 µm thick, with a distinct midrib (at least in lower portions); branching once or twice pinnate, with opposite, serrate first-order laterals 10–35 × 1–1.5 mm. Second-order laterals irregularly opposite and serrate, 2–8 × 400–500 µm. Structure multiaxial, with a central medulla of longitudinal filaments 10–11 µm in diameter and an abrupt transition to a 2–4-layered inner cortex of isodiametric clear cells 21–60 µm in diameter and a 1- or 2-layered outer cortex of

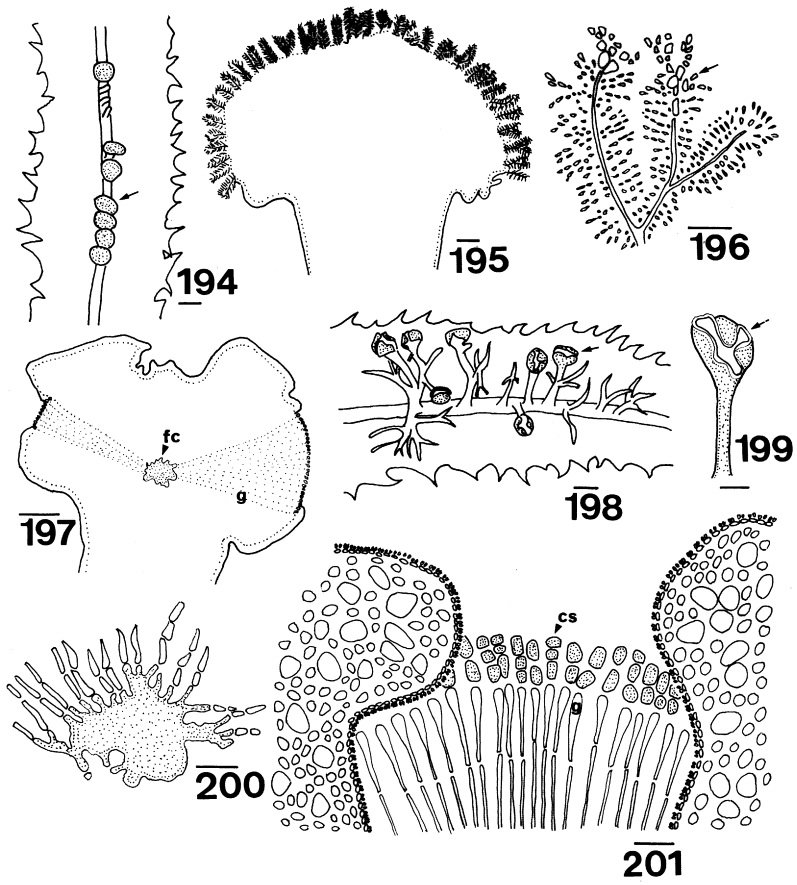


Fig. 194. *Phacelocarpus neurymenioides*. Habit of fertile branchlet bearing knob-shaped spermatangial nemathecia (arrow) (SUVA (USP) 841). Scale bar = 1 mm. **Fig. 195.** *Phacelocarpus neurymenioides*. Semi-diagrammatic drawing of a longitudinal section of a spermatangial nemathecium (SUVA (USP) 841). Scale bar = 100 µm. **Fig. 196.** *Phacelocarpus neurymenioides*. Single spermatangial filament bearing spermatangial systems (arrow) (SUVA (USP) 841). Scale bar = 20 µm. **Fig. 197.** *Phacelocarpus neurymenioides*. Semi-diagrammatic drawing of a longitudinal section of a cystocarp, showing fan-shaped gonimoblast filaments (g) and fusion cell (fc) (SUVA (USP) 842). Scale bar = 100 µm. **Fig. 198.** *Phacelocarpus neurymenioides*. Habit of fertile branchlet bearing stalked cystocarps (arrow) (SUVA (USP) 842). Scale bar = 1 mm. **Fig. 199.** *Phacelocarpus neurymenioides*. Detail of bilabiate cystocarp with ostiolar slit (arrow) (SUVA (USP) 842). Scale bar = 500 µm. **Fig. 200.** *Phacelocarpus neurymenioides*. Detail of central fusion cell (SUVA (USP) 842). Scale bar = 20 µm. **Fig. 201.** *Phacelocarpus neurymenioides*. Longitudinal section through ostiolar slit of a cystocarp, showing gonimoblast filaments (g) terminated by carposporangia (cs) (SUVA (USP) 842). Scale bar = 20 µm.

pigmented isodiametric cells 7–14 µm in diameter. Outermost cells ovoid, 3–4 µm in diameter. Reproduction not seen.

Habitat and Remarks

Growing in relatively deep water (at a depth of 30–40 m) at the entrance to Suva Harbour. All specimens collected so far are sterile, although some young plants occur in the collections (USP 859, 878).

Genus ***Meristotheca*** J.Agardh 1872

Key to the Suva Lagoon and Reef Species of *Meristotheca*

1. Thallus procumbent, not peltate or stipitate ..... *M. procumbens*
   Thallus peltate, stipitate ..... *M.* sp.

Meristotheca procumbens P.Gabrielson et Kraft 1984: 241, fig. 14*A–D* (type locality: Lord Howe I., Australia) (Figs 208, 209, 231)

Fiji and Rotuma Records

N'Yeurt 1993: 164, figs 171, 176–181, 237, 238; 1995: 248, figs 3–10; South *et al.* 1993: 190; N'Yeurt 1996: 416, figs 137, 142–147, 203–205; N'Yeurt *et al.* 1996*b*: 80.

Representative Material Examined

Nukulau I. (*Keats*, 27.xi.1994: SUVA (USP) 881, S13: 5); Rotuma I. (*Booth ex. Government Officer*, x.1975: BISH 536995 + Jar 474694; 8.viii.1977: BISH 537010 + Jar 512057; *N'Yeurt*, 2.iii.1992: SUVA (USP) 351); Afaahiti, Tahiti I. (*N'Yeurt*, 10.vi.1997: *in Herb.* UFP).

Other Material Examined

Meristotheca coacta Okamura (Koshiki, Japan. *Okamura*, vii.1917: in SAP, n.n. *lectotype*, *cystocarpic*; vii.1917: SUVA (USP) 957 (dried isotype, *cystocarpic*), USP 1143 (liquid-preserved isotype); *Anonymous*, viii.1940: SAP 023948; *anonymous*, 23.vii.1994: SAP 061418, *spermatangial*); *Meristotheca papulosa* (Montagne) J.Agardh (Japan, *anonymous*, 15.iv.1990: SAP 060003).

Thallus reddish-yellow, prostrate, characteristically maculate with whitish blotches on upper surface and turgid when fresh, procumbent, up to 6 cm in diameter, irregularly lobed and branched; margin occasionally fimbriate; surface smooth. Frond attached at various points to substratum via terete haptera up to 2 mm long issued from the ventral surface and the margins. Frond 780–818 µm thick, structure multiaxial; composed of an inner medulla of septate and branched rhizoidal filaments 2.5–4 µm in diameter (40% of thallus) and elongate medullary cells 58–76 µm in diameter. Outer medullary cells are 17–33 µm in diameter and have a characteristic stellate appearance owing to multiple secondary pit connections with adjacent cells. The medulla of mature thalli is surrounded on both sides by equal thicknesses of a cortex grading from large unpigmented, multinucleate stellate–ovate cells 11–13 µm in diameter to a surface layer of small, pigmented uninucleate and elliptical cells 3–4 × 11–13 µm. Long, traversing rhizoids are initiated from the inner cortical cells. Specimen sterile.

Habitat and Remarks

Growing on coral debris at a depth of 6 m; rare (one single plant found).

Specimens of this genus having been collected in October 1975 and August 1977 from Rotuma Island (in BISH) by a Government officer and identified by Dr W. E. Booth as *Meristotheca* sp. These specimens were examined and found identical to the Fijian material from Suva. Further collections from Rotuma were described by N'Yeurt (1993, 1995, 1996).

The restricted distribution patterns of *Meristotheca procumbens* were discussed in N'Yeurt (1996) and N'Yeurt and South (1997). Since then, this alga has also been found in Fiji (this study) and on a fringing reef in Tahiti, French Polynesia (Payri *et al.* 2000) and it seems likely to be widely distributed in the south-western and eastern Pacific.

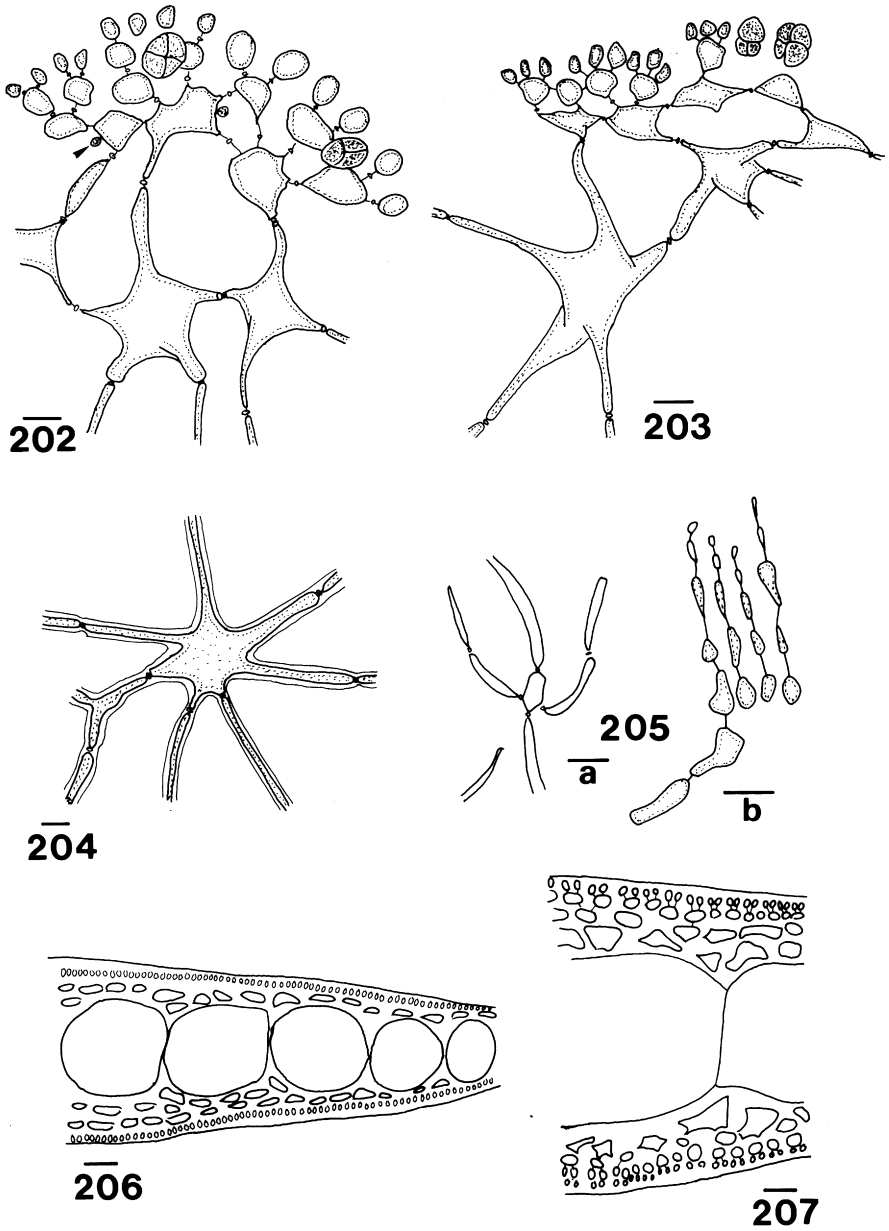


Fig. 202. *Sebdenia flabellata*. Cross-section of thallus showing stellate outer medullary cells, cortical tetrasporangia and gland cells (arrowhead) (SUVA (USP) 1174). Scale bar = 10 µm. **Fig. 203.** *Sebdenia* sp. Cross-section of thallus, showing tetrasporangia (SUVA (USP) 5522L). Scale bar = 20 µm. **Fig. 204.** *Sebdenia* sp. Detail of outer medullary stellate cell (SUVA (USP) 5522L). Scale bar = 20 µm. **Fig. 205.** (*a*) *Kallymenia* sp. Medullary filaments (SUVA (USP) 1182). Scale bar = 20 µm. (*b*) Outer cortex with terminal spermatangia (SUVA (USP) 1182). Scale bar = 10 µm. **Fig. 206.** ?*Sciadophycus* sp. Cross-section of thallus near blade margin (SUVA (USP) 1181). Scale bar = 100 µm. **Fig. 207.** ?*Sciadophycus* sp. Cross-section of thallus in middle portion (SUVA (USP) 1181). Scale bar = 20 µm.

The Rotuman material underwent molecular sequencing and was found to belong well within the *Meristotheca–Meristiella* clade (S. Fredericq, pers. comm.). The same material was also examined by Drs Paul Gabrielson and G. T. Kraft (pers. comm.) and confirmed as being vegetatively identical to *M. procumbens* from the type locality of Lord Howe Island. No reproductive thalli were found, either in the Rotuman, Fijian or Tahitian material, which warrants further investigation of the life cycle of this species.

Structurally, the Fijian, Rotuman and Tahitian material are roughly identical to *Meristotheca coacta* Okamura from Japan (Fig. 211). A wide range of thallus habit was noted in collections of this species in the herbaria of K. Okamura and Y. Yamada (now incorporated in SAP), from complanately lobed, smooth and procumbent (SAP 023948) to narrow, papillate and dichotomously branched specimens only 4 mm wide (SAP 061418, *spermatangial*), but most specimens exhibit subdichotomous to dichotomous branching and relatively narrow, imbricating axes, which are characters not usually seen in *M. procumbens* from the South Pacific. The cystocarpic lectotype and isotypes of *M. coacta* in SAP and USP have undulate but not particularly fimbriate margins, with characteristically narrow (3–5 × 10–15 mm), subdichotomously branched and loosely imbricated ultimate axes (Fig. 210). The frond lobes have also an overlapping, tiered habit with undulate margins and papillate upper surfaces (A. D. R. N'Yeurt, pers. obs.). However, the separation of species on vegetative (and especially morphological) characters alone is subject to question, considering the wide range of variations observed in a single species, possibly linked to environmental conditions. It could well be that the Japanese and South Pacific entities are the same (in which case *M. coacta* has nomenclatural priority) or that *M. procumbens* occurs in Japan and elsewhere, but a definite answer must await detailed, possibly molecular studies of a wide range of specimens, including a detailed comparison of reproductive development.

Meristotheca sp. (Figs 212–216)

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 7.xi.1994: SUVA (USP) 5407L, *cystocarpic*; 13.xi.1999: SUVA (USP) 5482L, spermatangial).

Thallus strictly peltate, 20–30 mm in diameter and 870–900 µm thick, with ruffled frilly edges, attached solitarily to the substratum via a prominent central stipe 3–4 × 5–7 mm. Secondary holdfasts or attachment points absent. Colour reddish-green, sometimes blotchy on upper surface, with shallowly to deeply incised dentate edges. Medulla consisting mostly of rhizoidal filaments 2–5 µm in diameter with multiple secondary pit connections; cortex pseudoparenchymatous with large stellate multinucleate inner cortical cells 42–60 µm in diameter, with abundant secondary pit connections, initiating transversely traversing rhizoids. Outer cortical cells elliptical, 6–7 µm in diameter, with the cortical cells immediately below spherical to ovoid, 14–16 µm in diameter, refractive with much starch content. Carpogonial branch not seen; mature cystocarps 1–1.5 mm in diameter, with a dense ostiolate pericarp bearing occasional spines; marginal and protuberant on upper surface of frilly edge of thallus. Carposporophyte 545–800 µm in diameter, with a surface layer of ovoid carposporangia 7–11 µm in diameter around a central placenta of fused vegetative and gonimoblast cells. Spermatangia terminal on outer cortical cells, in superficial patches on slopes of raised nemathecia. Tetrasporangia not seen.

Habitat and Remarks

Growing at a depth of 20 m, on coralline substratum.

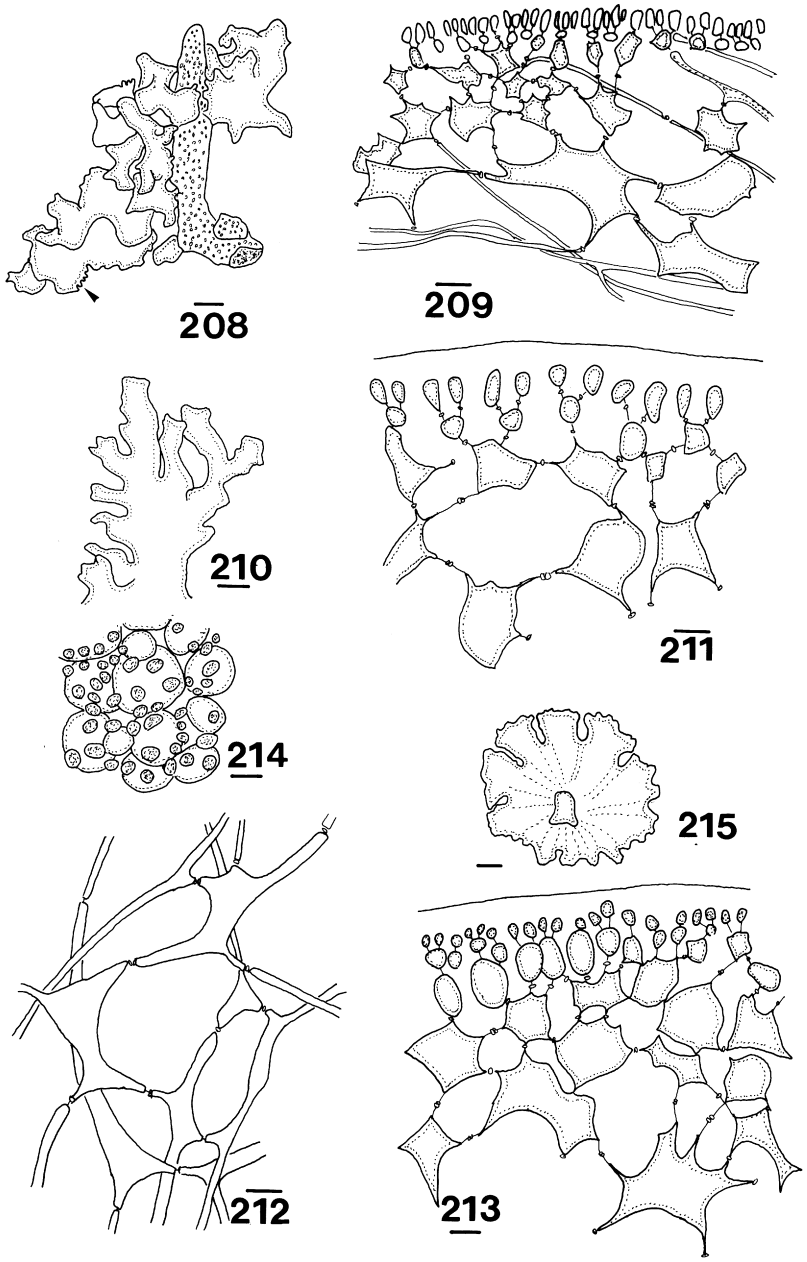


Fig. 208. *Meristotheca procumbens*. Habit, showing attachment to coral substratum via marginal haptera (arrowhead) (SUVA (USP) 351). Scale bar = 10 mm. **Fig. 209.** *Meristotheca procumbens*. Cross-section of thallus (SUVA (USP) 881). Scale bar = 20 µm. **Fig. 210.** *Meristotheca coacta*. Habit of Japanese isotype. Scale bar = 5 mm. **Fig. 211.** *Meristotheca coacta*. Cross-section of Japanese isotype. Scale bar = 10 µm. **Fig. 212.** *Meristotheca* sp. Medullary filaments (SUVA (USP) 5407L). Scale bar = 10 µm. **Fig. 213.** *Meristotheca* sp. Cross-section of thallus (SUVA (USP) 5407L). Scale bar = 20 µm. **Fig. 214.** *Meristotheca* sp. Surface of thallus (SUVA (USP) 5407L). Scale bar = 20 µm. **Fig. 215.** *Meristotheca* sp. Peltate habit of cystocarpic thallus, showing fimbriate deeply incised margin and central stipe (SUVA (USP) 5407L). Scale bar = 5 mm.

This distinctly peltate species is unlike any other *Meristotheca* described so far in the literature. However, its internal anatomy and female reproductive structure show it to belong in the genus (R. E. Norris, pers. comm.), while its consistently peltate habit and single, prominent central stipe and the total lack of secondary holdfasts could not in our opinion be attributed to a mere habit variation of *M. procumbens*. A formal description and comparison with other species is being published elsewhere.

Family **Acrotylaceae** Schmitz 1892: 18

Monographs on this family include Kraft (1977) and Kraft and Min-Thein (1983). A single member of this usually temperate family occurs in Fiji.

Genus ***Corynocystis*** Kraft in Kraft *et al.* 1999: 26
Corynocystis prostrata Kraft in Kraft *et al.* 1999: 26, figs 6, 45–60 (type locality: Bulusan, Philippines) (Figs 107, 108, 217)

Fiji and Rotuma Records

Kasahara 1985: 54, pl. 10, fig. 1, pl. 15, fig. *F* (as *Carpopeltis formosana* Okamura);

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 18.ix.1985: SUVA (USP) 709, 710); Fish Patch (*Keats*, 18.v.1994: SUVA (USP) 715; 2.xi.1994: SUVA (USP) 847; 15.xi.1994: SUVA (USP) 1184, *cystocarpic*); Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) 763); Moorea I., French Polynesia (*N'Yeurt*, vii.1997: *in Herb.* UFP).

Thallus forming cartilaginous brownish-red clumps to 10 cm broad, flattened and irregularly complanately branched. Branches imbricated, 245–530 µm thick, 3–4 mm wide and 12–15 mm long, with rounded apices, thickened margins and abruptly constricted bases; marginal proliferations sometimes present, giving rise to further axes. Structure multiaxial, with a densely filamentous medulla composed of thick-walled filaments 18–19 µm in diameter and a 3- or 4-layered cortex of progressively smaller subspherical to ovoid cells 3–12 µm in diameter; outermost cells elongate and darkly pigmented. Reproductive structures terminal on terete, alternate marginal proliferations 4–8 mm long; cystocarps ostiolate, 225–230 µm in diameter, embedded in outer medulla. Carposporophyte without a fusion cell; gonimoblast filaments growing from cystocarp wall. Carposporangia irregularly angular, 3–6 µm in diameter.

Habitat and Remarks

Growing in clumps, on coralline substratum. A whitish sponge seems to be always associated on the underside of the thallus of this species, both in Fiji and in French Polynesia. The plants appear to have a peak in abundance in the cooler months.

Family **Phacelocarpaceae** Searles 1968: 8
Genus ***Phacelocarpus*** Endlicher et Diesing 1845: 289, *nomen conservandum*

Phacelocarpus neurymenioides N'Yeurt, Keats et R.E.Norris 1995: 341, figs 1–17 (type locality: Fish Patch, Suva Barrier Reef, Fiji) (Figs 184–201)

Fiji and Rotuma Records

N'Yeurt *et al.* 1995: 341, figs 1–17; 1996: 79.

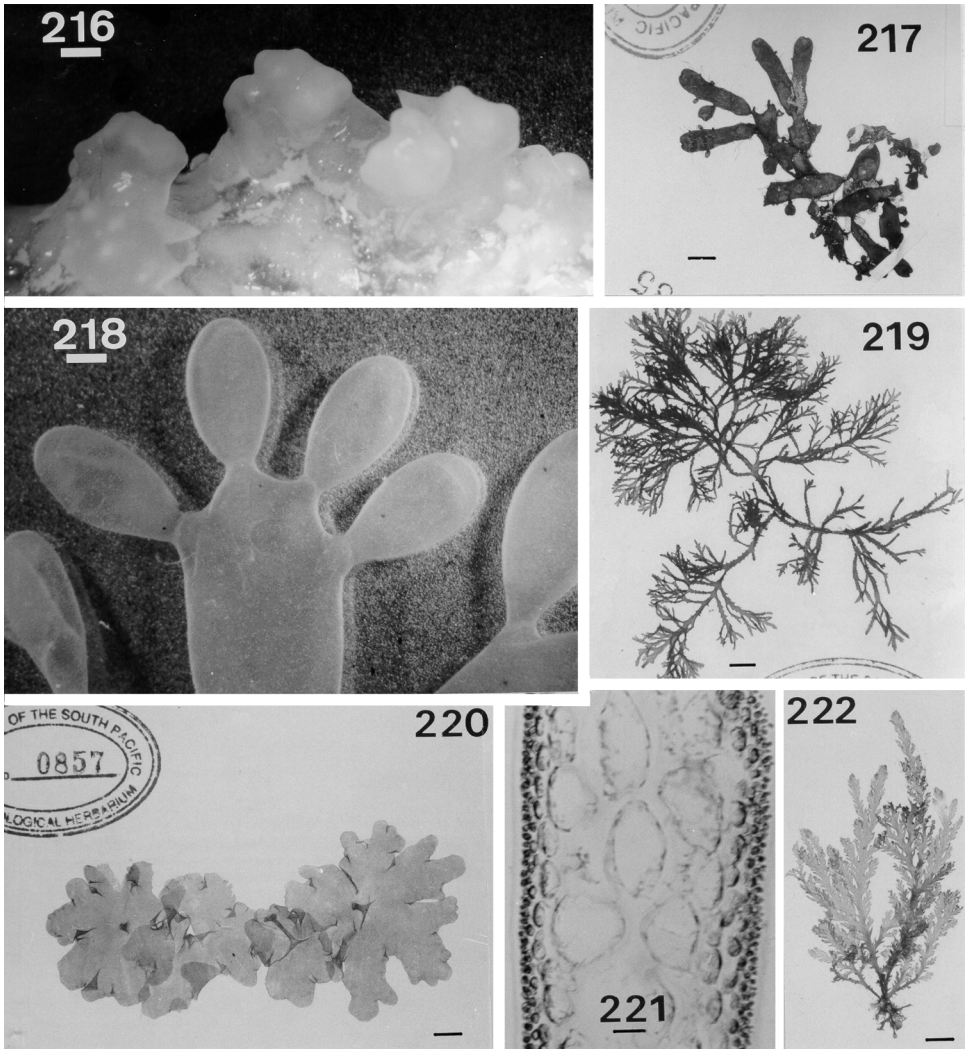


Fig. 216. *Meristotheca* sp. Detail of marginal cystocarps (SUVA (USP) 5407L). Note short spines. Scale bar = 400 µm. **Fig. 217.** *Corynocystis prostrata*. Habit (SUVA (USP) 1184). Scale bar = 5 mm. **Fig. 218.** *Chamaebotrys boergesenii*. Habit (SUVA (USP) 1177). Scale bar = 500 µm. **Fig. 219.** *Callophycus serratus*. Habit (SUVA (USP) 859). Scale bar = 5 mm. **Fig. 220.** *Halichrysis coalescens*. Habit, showing central stalks of coalescent thalli (SUVA (USP) 857). Scale bar = 5 mm. **Fig. 221.** *Halichrysis coalescens*. Cross-section of thallus (SUVA (USP) 857). Scale bar = 20 µm. **Fig. 222.** *Plocamium cartilagineum*. Habit (SUVA (USP) 640). Scale bar = 5 mm.

Representative Material Examined

Nukulau I. (*Carlson*, 20.viii.1972: SUVA (USP) 680; as 'Family Delessariaceae'); Toberua Pass (*Carlson*, 25.iii.1973: BC 16-73, USP 238 (as '*Sargassum* sp.'); Suva Barrier Reef (*Kasahara*, 18.ix.1985: SUVA (USP) 677; as '*Neurymenia* sp.'); Fish Patch (*Keats*, 10.v.1994: SUVA (USP) 666, 670; 18.v.1994: SUVA (USP) 695, 835, 836, 837; 5.x.1994: SUVA (USP) 806, 807); Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) 753).

A detailed description of this species is given in N'Yeurt *et al.* 1995.

Habitat and Remarks

Found in caves and in shaded locations on the outer reef slope, at depths of 10–40 m. Specimens collected from 10–30 m were fertile and moderately to heavily encrusted with bryozoans and smaller algal epiphytes. Deeper-water plants (30–40 m) were noticeably less fertile and freer of epiphytes. Between the latter depths, plants tend to occur in the open, mixed with *Neurymenia fraxinifolia* (Mertens ex Turner) J.Agardh, which they superficially resemble. The population seems to be dominated by tetrasporophytes, with the cystocarpic and spermatangial plants being relatively rare (approximately 10–15% of the total number of plants examined).

Order **Plocamiales** Saunders et Kraft 1994: 1260
Family **Plocamiaceae** Kützing 1843: 442, *nomen conservandum*
Genus ***Plocamium*** Lamouroux 1813: 137, *nomen conservandum*

Plocamium cartilagineum (Linnaeus) Dixon 1967: 58, South and Adams 1979: 124, figs 2, 11–15; Womersley 1994: 389, figs 131*A–D* (Figs 222, 227, 229)

Basionym and Nomenclatural Synonymy

Fucus cartilagineus Linnaeus 1753: 1161 (type locality: northern Europe *fide* Dixon 1967: 55).

Fiji and Rotuma Records

Possibly Grunow (1874: 35; as *P. botryoides* Kützing, from Ovalau I.); Chapman 1971 (as *P. abnorme* Hooker et Harvey; see note below); South *et al.* 1993: 188, fig. 5; N'Yeurt *et al.* 1996*b*: 80.

Representative Material Examined

Nukulau Channel (*Carlson*, 20.viii.1972: SUVA (USP) 314); Toberua Passage, Tailevu (*Carlson*, 3.xii.1972: SUVA (USP) 316; tetrasporic); Makaluva I. (*South*, 9.ix.1991: SUVA (USP) 315; *Seeto*, 8.vi.1993: SUVA (USP) 640, S8: 13–15; tetrasporic); Suva Barrier Reef (*Kasahara*, 18.ix.1985: SUVA (USP) 708, 712).

Thallus 5–12 cm tall, main axis 1–2 mm wide; with ramuli 0.5–1 mm wide in alternate series of 3 or 4. Adventitious ramuli opposite to or between members of the alternating series not present. Lowermost ramuli simple, not hooked. Tetrasporangia 27–44 × 14–23 µm, zonately divided; tetrasporangial stichidia 230–243 × 107–114 µm, pedicellate in axis of ramuli, or grouped on the upper margins of ramuli and along the axis; at first simple and subsequently becoming branched at wide angle and elongate.

Distribution

Fiji, Tahiti, Australia (including Lord Howe I.); Mauritius, Pakistan, New Zealand, temperate seas.

Habitat and Remarks

Found on the reef flat, often hidden beneath rocks or sea urchins (e.g. at Makaluva I.), or in inlets behind the fore-reef south of the reef passage (e.g. at Toberua).

According to Womersley (1971) and South and Adams (1979) this is a widespread, mostly temperate species. The Fijian (and more recently, Tahitian) records are thus interesting and warrant molecular investigation to ascertain or deny their conspecificity with the New Zealand and Australian material. Chapman (1971) reported *P. abnorme* from

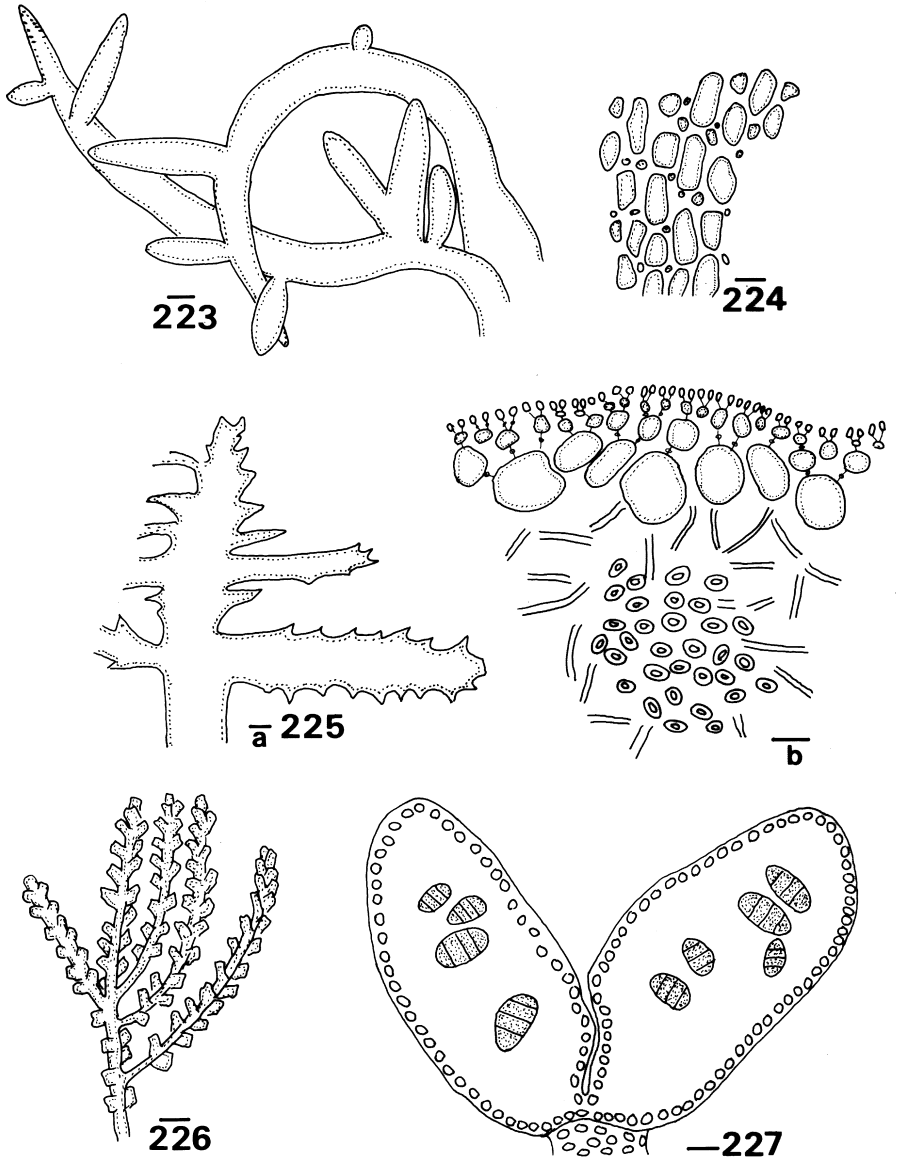


Fig. 223. *Lomentaria corallicola*. Habit (SUVA (USP) S11: 15). Scale bar = 200 µm. **Fig. 224.** *Lomentaria corallicola*. Surface of thallus (SUVA (USP) S11: 15). Scale bar = 20 µm. **Fig. 225.** (*a*) *Callophycus serratus*. Habit (SUVA (USP) 859). Scale bar = 500 µm. (*b*) Cross-section of thallus at midrib, showing central medulla of longitudinal filaments and abrupt transition to cortex (SUVA (USP) 859). Scale bar = 20 µm. **Fig. 226.** *Laurencia glandulifera*. Habit (SUVA (USP) 307). Scale bar = 3 mm. **Fig. 227.** *Plocamium cartilagineum*. Tetrasporangial stichidia (SUVA (USP) 640). Scale bar = 20 µm.

Fiji, but the material could not be located in AKU and verification was not possible; however, some large tetrasporic specimens housed in SUVA collected by Bruce Carlson from the Suva area in 1972 and identified as *P. abnorme* by V. J. Chapman were re-examined and found to be in good agreement with *P. cartilagineum* as described by South and Adams (1979) and Womersley (1994).

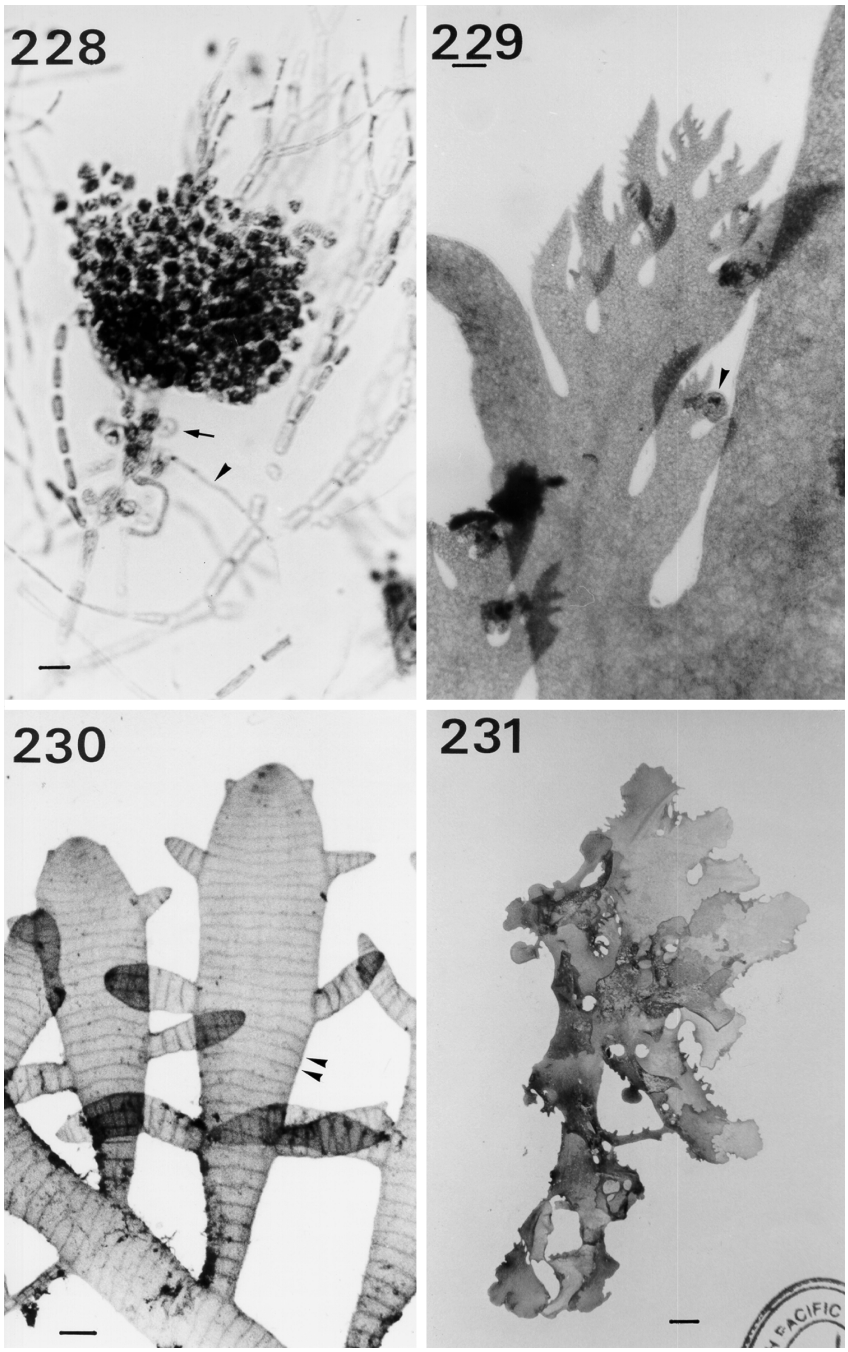


Fig. 228. *Predaea weldii*. Mature cystocarp, showing globular nutritive cell on cell proximal to auxiliary cell (arrow) and remains of connecting filament (arrowhead) (SUVA (USP) S13: 20). **Fig. 229.** *Plocamium cartilagineum*. Detail of side branchlet, with tetrasporangia stichidia (arrowhead) (SUVA (USP) 640). Scale bar = 500 µm. **Fig. 230.** *Champia vieillardii*. Habit, showing lack of constrictions at diaphragms (arrowheads) (SUVA (USP) S9: 19). Scale bar = 700 µm. **Fig. 231.** *Meristotheca procumbens*. Habit of dried pressed material (SUVA (USP) 881). Scale bar = 5 mm.

Order **Halymeniales** Saunders et Kraft 1996: 703
Family **Halymeniaceae** Bory 1828: 158 (= **Cryptonemiaceae**, see Guiry 1978)
Genus ***Halymenia*** C.Agardh, *nomen conservandum*

The taxonomy of this genus was revised by Parkinson (1980).

Key to the Suva Lagoon and Reef Species of *Halymenia*

1. Thallus deep red in colour, ultimate branches wide (5–30 mm) and strap-shaped; thick and coriaceous when dry, marginal teeth and surface excrescences common; anticlinal medullary filaments absent . . . . . *H. durvillei*
   Thallus rose pink in colour, ultimate branches narrow (1–3 mm) and fusiform; thin and papery when dry, marginal teeth and surface excrescences absent; anticlinal medullary filaments present . . . . . *H. floresia*

Halymenia durvillei Bory de Saint-Vincent 1828 (1826–1829): 180–181, pl. 15 ('*durvillaei*') (type locality: New Ireland, Papua New Guinea); Abbott 1999*a*: 165, figs 1–4 (Figs 127, 132)

Misapplied Name

Halymenia durvillei Bory de Saint-Vincent var. *ceylanica* (Kützing) Weber-van Bosse 1921: 235, pl. VIII, fig. 1 (type locality: Sri Lanka).

Fiji and Rotuma Records

Chapman 1977: 162, pl. 1; Kasahara 1985: 55, pl. 10, fig. 2 (as *Halymenia durvillei* Bory de Saint-Vincent var. *ceylanica* (Kützing) Weber-van Bosse); N'Yeurt *et al.* 1996*b*: 74.

Representative Material Examined

Fish Patch (*Keats*, 10.v.1994: SUVA (USP) 668; 18.v.1994: SUVA (USP) 716, 717; 21.ix.1994: SUVA (USP) 794; *Brooks*, 21.iii.1996: SUVA (USP) 1010, 1011).

Thalli deep red in colour, firmly gelatinous and slippery when fresh, 10–30 cm tall, irregularly branched and radially twisted, attached to the substratum by a distinct ovoid to discoid holdfast 10–15 mm in diameter and a short terete stipe about 2 × 5–6 mm; main branches 10–35 mm wide; branching irregularly dichotomous at most to the fourth or fifth order; small to medium marginal teeth present on most branches, acute excrescences common on the thallus surface; ultimate branches thick and strap-shaped, 5–30 mm wide, not basally constricted, irregularly branched with dentate, mostly truncate and sometimes acute apices. Texture coriaceous and thick when dry, margins serrate to the touch. Inner medulla composed of irregularly branched filaments 8–9 µm in diameter; subcortex composed of 4–6 layers of stellate cells 18–25 µm in diameter, with numerous secondary pit connections. Cortex pseudoparenchymatous, 2 or 3 cells thick; inner cortical cells ovoid to subglobose, 8–12 µm in diameter, with many secondary pit connections. Outermost cells elongate and 'rabbit ear' shaped, 4–6 × 7–14 µm. Large, deeply staining ganglionic cells present. Reproduction not seen.

Habitat and Remarks

Commonly found on the outer reef wall and passes, at a depth of 10–40 m. The deep-red hue, large size and strap-like outline of this alga are characteristic in the field. The width, proliferous nature and branching pattern of the plants are highly variable, both between specimens and within a single thallus.

This species was reported as *Halymenia durvillei* Bory de Saint-Vincent var. *ceylanica* (Kützing) Weber-van Bosse by Kasahara (1985, p. 55). Silva *et al.* (1996: 199), on the other hand, consider *H. durvillei* var. *ceylanica* to be a synonym of *Halymenia microcarpa* (Montagne) P.Silva (in P. Silva *et al.* 1987, p. 31). This is based on the proposed conspecificity of *Mesogloia microcarpa* Montagne (1844, p. 660) and *Halymenia ceylanica* Kützing (1866, p. 33, pl. 93, figs *a*, *b*) from the Philippine Islands by Grunow (1874, p. 32). It is pertinent however that Grunow (1874, p. 32) in the same treatment retains the name *H. durvillei* for plants from Upolu and Lifuka Islands, Western Samoa, noting that the Samoan species is very variable and has close affinities to *H. ceylanica* and *H. formosa* (Harvey ex Kützing 1866, p. 33, pl. 91, figs *g–h*), while reducing the latter two species in synonymy. This opinion was supported by Weber-van Bosse (1921, p. 233) based on what she termed the 'nearly unlimited variability' of these entities; however, *H. formosa* is retained as a separate species by Silva *et al.* (1996, p. 198), who add that Harvey (1857*b*, no. 55, exsiccata) failed to include a description when he proposed his new species from Tonga.

Halymenia floresia (Clemente y Rubio) C.Agardh 1817: XIX; Abbott 1999*b*: 167, figs 5–9 (Figs 129, 133)

Basionym and Nomenclatural Synonymy

Fucus floresius Clemente y Rubio 1807: 312 (type locality: Sanlúcar de Barrameda, Cádiz, Spain).

Fiji and Rotuma Records

Kasahara 1985: 55, pl. 10, fig. 3; N'Yeurt *et al.* 1996*b*: 74.

Representative Material Examined

Suva Barrier Reef (*Faloon*, x.1993: SUVA (USP) 741; *Keats*, 5.x.1994: SUVA (USP) 793); Nukulau I. (*Carlson*, 20.viii.1972: SUVA (USP) 297).

Thallus thin and profusely branched, 7–30 cm high, very soft and slippery when fresh, attached to the substratum by a small irregular holdfast. Main branches flattened, 4–15 µm wide; branching frequent and subdichotomous to dichotomous, up to the tenth order, marginal teeth absent; ultimate branches flattened to subterete; narrow (1–3 mm), regularly dichotomously branched, not basally constricted, with attenuated, acute apices. Texture papery and thin when dry; margins smooth to the touch. Internally, thallus composed of a lax medulla, with filaments 2.5–3 µm in diameter passing transversely across the thallus (anticlinally) in young parts; outer medulla composed of stellate cells 6–12 µm in diameter, with numerous secondary pit connections. Cortex 2 or 3 cells thick; inner cells ovoid to subspherical, 5–7 µm in diameter, outermost cells obovoid to mostly elongate, 5–12 × 2.5–4 µm. Reproduction not seen.

Habitat and Remarks

Abbott (1999*b*) discusses the taxonomy of this highly variable species.

Genus ***Prionitis*** J.Agardh 1851: 185, *nomen conservandum*
Prionitis angusta (Okamura) Okamura 1899: 4; Kawaguchi 1989: 203, figs 7–10 (Fig. 128)

Basionym and Nomenclatural Synonymy

Cryptonemia angusta Okamura 1895: 478, pl. IX, figs 8–15 (type locality: Shimoda, Shizuoka Prefecture, Japan).

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 74.

Representative Material Examined

Toberua (*Carlson*, 25.iii.1973: SUVA (USP) 136, as '*Gracilaria eucheumoides Harvey*'; cystocarpic); Makaluva I. (*Gounder, N'Yeurt, Raj-Prasad and South*, 9.ix.1991: SUVA (USP) 137; *Kasahara*, 17.x.1985: SUVA (USP) 713); Suva Barrier Reef (*Ballou*, 10.ii.1995: SUVA (USP) 855).

Thalli up to 12 cm high and 1–2 mm in diameter, strongly flattened and rigid in texture when dry. Branching dichotomous, with the base of branches slightly constricted at the dichotomies. Branches with specially developed small lateral proliferations (sporophylls). Internal anatomy consisting of a medulla of interwoven, thick-walled filaments 3–7 µm in diameter surrounded by a cortical layer of isodiametric to subrectangular cells 1–3 µm in diameter. Material sterile.

Habitat and Remarks

Found intertidally on the outer reef flat and up to 15–30-m depth on the outer reef wall. Although the material is sterile, its vegetative characters most closely approach *P. angusta* (S. Kawaguchi, *in. lit*.).

Family **Sebdeniaceae** Kylin 1932
Genus ***Sebdenia*** (J.Agardh) Berthold 1884

Key to the Suva Lagoon and Reef Species of *Sebdenia*

1. Thallus terete to compressed, fastigiately branched ..... *S. flabellata*
   Thallus flattened to globular, irregularly branched ..... *S.* sp.

Sebdenia flabellata (J.Agardh) Parkinson 1980: 12; Millar *et al.* 1999: 558, fig. 3*F* (Fig. 202)

Basionym and Nomenclatural Synonymy

Isymenia flabellata J.Agardh 1899: 66 (type locality: Guadeloupe).

Fiji and Rotuma Records

N'Yeurt 1997: 250.

Representative Material Examined

Suva Barrier Reef (*Keats*, 8.x.1994: SUVA (USP) 1174, *tetrasporic*).

Thallus up to 14 cm high, repeatedly forked and fastigiate with terete to compressed segments 5–8 mm in diameter, broadened to 12 mm below dichotomies. Branch apices obtuse, forcipate. Colour dark red, texture coriaceous but drying to a thin film. Structure consisting of an inner region of lax filaments 3–4 µm in diameter and an outer medulla of stellate cells 13–19 µm in diameter. Cortex 1- or 2-layered, pseudoparenchymatous with numerous secondary pit connections between inner cortical cells. Inner cortical cells subisodiametric, 6–7 µm in diameter with mucilaginous gland cells 1.5–2 µm in diameter. Outer cortical cells ovoid, 3–4 µm in diameter. Tetrasporangia cruciately divided, 8.5–10 µm in diameter, scattered in outer cortex.

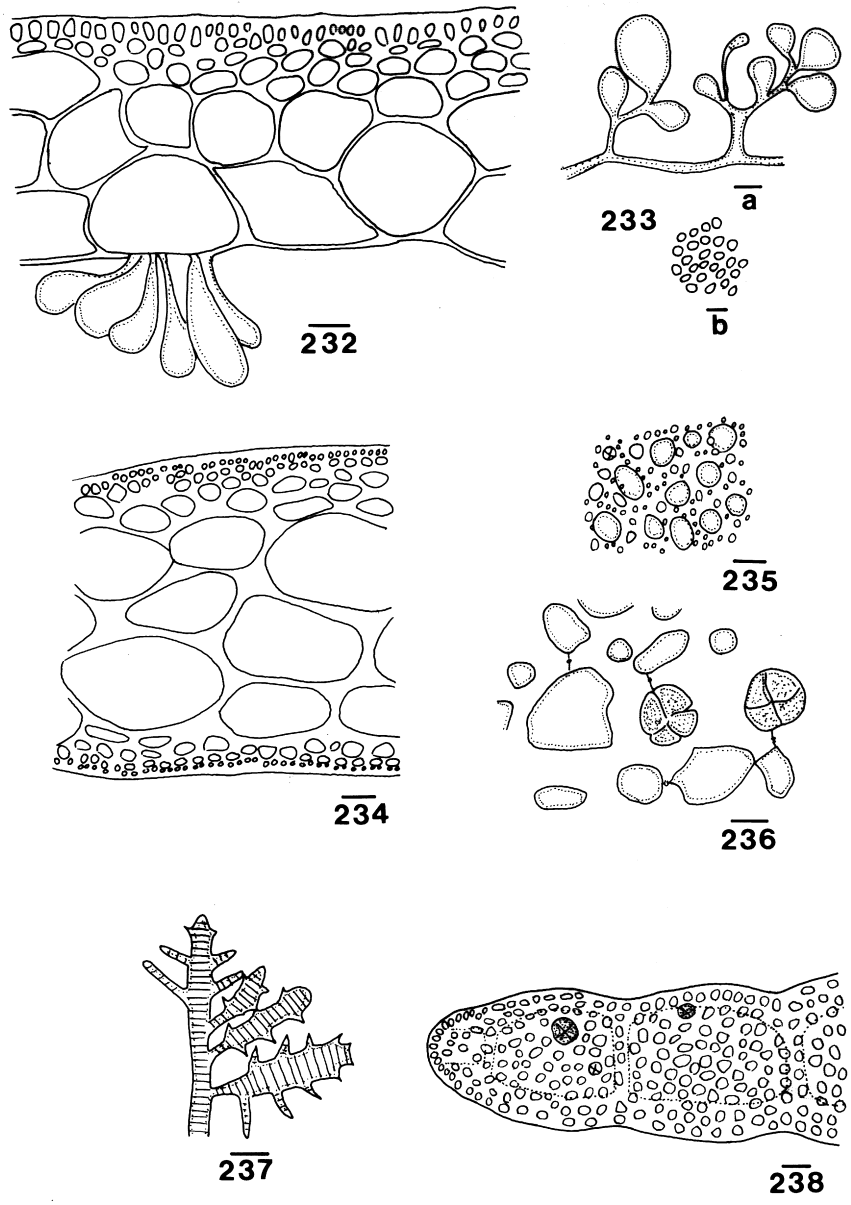


Fig. 232. *Botryocladia skottsbergii*. Cross-section of thallus showing elongate pyriform gland cells (SUVA (USP) S11: 1). Scale bar = 20 µm. **Fig. 233.** (*a*) *Botryocladia skottsbergii*. Habit (SUVA (USP) S11: 1). Scale bar = 3 mm. (*b*) Surface cells of vesicle. Scale bar = 10 µm. **Fig. 234.** *Halichrysis coalescens*. Cross-section of thallus (SUVA (USP) 857). Scale bar = 20 µm. **Fig. 235.** *Chamaebotrys boergesenii*. Surface cells of thallus (SUVA (USP) 1177). Scale bar = 100 µm. **Fig. 236.** *Chamaebotrys boergesenii*. Cruciately divided tetrasporangia showing single attachment point to adjacent cells (SUVA (USP) 1177). Scale bar = 10 µm. **Fig. 237.** *Champia vieillardii*. Habit (SUVA (USP) S9: 19). Scale bar = 3 mm. **Fig. 238.** *Champia parvula*. Habit, showing regular constrictions at diaphragms and tetrasporangia scattered in outer cortex (SUVA (USP) S11: 18). Scale bar = 100 µm.

Habitat and Remarks

Grows at 10–15-m depth, on the outer reef wall. The Fijian material is in good agreement with holdings of this species from Japan held in SAP.

Sebdenia sp. (Figs 203, 204)

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 97 (in error, as *Sebdenia yamadae* Okamura et Segawa); N'Yeurt 1997: 251, figs 203, 204, pl. I*c*.

Representative Material Examined

Suva Barrier Reef (*Keats*, 1.xii.1994: SUVA (USP) 913L, 5521L; 5522L t*etrasporic*; 5523.

Thallus deep red in colour, 3–10 cm broad, compressed to aplanate, soft and lubricous, of irregularly branched mamillate lobes. Attached to the substratum via a single, terete, basal holdfast. Appearance cerebral when fresh. Adheres well to paper on drying. Structure consisting of an inner region of lax filaments 4–5 µm in diameter and medulla of large stellate cells 33–45 µm in diameter, issuing 4 or 5 filamentous connections to irregularly stellate outer medullary cells 22–27 µm in diameter. Cortex 1- or 2-layered, pseudo-parenchymatous with numerous secondary pit connections between inner cortical cells. Inner cortical cells subspherical, 13–15 µm in diameter, each usually supporting 3 outermost ovoid to subrectangular cortical cells 3–11 µm in diameter. Tetrasporangia 11–18 µm in diameter, cruciately divided, scattered in outer cortex.

Habitat and Remarks

Growing at a depth of 32 m, on coral substratum.

This species is unlike any *Sebdenia* species described in the literature, although its internal structure agrees well with the genus and its description is being published elsewhere. N'Yeurt *et al.* (1996) reported this species as *Sebdenia yamadae* Okamura et Segawa, but a recent comparison of the Fijian material with specimens of *S. yamadae* held in SAP (934994, 055344 *tetrasporangial*) confirmed that the Fijian material is undescribed. Furthermore, *S. Yamadae* was reported to have irregularly zonate tetrasporangia (Segawa 1938, p. 145, fig. 6*b*) and to lack stellate cells, in addition to other anatomical differences that were also confirmed by this study, which suggests that the Japanese plant does not belong in the genus *Sebdenia*.

Order **Rhodogorgonales** Fredericq, J.Norris et Pueschel in Fredericq and Norris 1995: 330
Family **Rhodogorgonaceae** Fredericq, J.Norris et Pueschel in Fredericq and Norris 1995: 329.
Genus ***Renouxia*** Fredericq et J.Norris 1995: 329.

Renouxia antillana Fredericq et J.Norris 1995: 329, figs 1–42 (type locality: Ilet à Caret (between Grande Terre and Basse Terre), Grand Cul de Sac Marin, Guadeloupe; Millar *et al.* 1999: 575, fig. 7*A* (Figs 239–241)

Fiji and Rotuma Records

N'Yeurt 1997: 253.

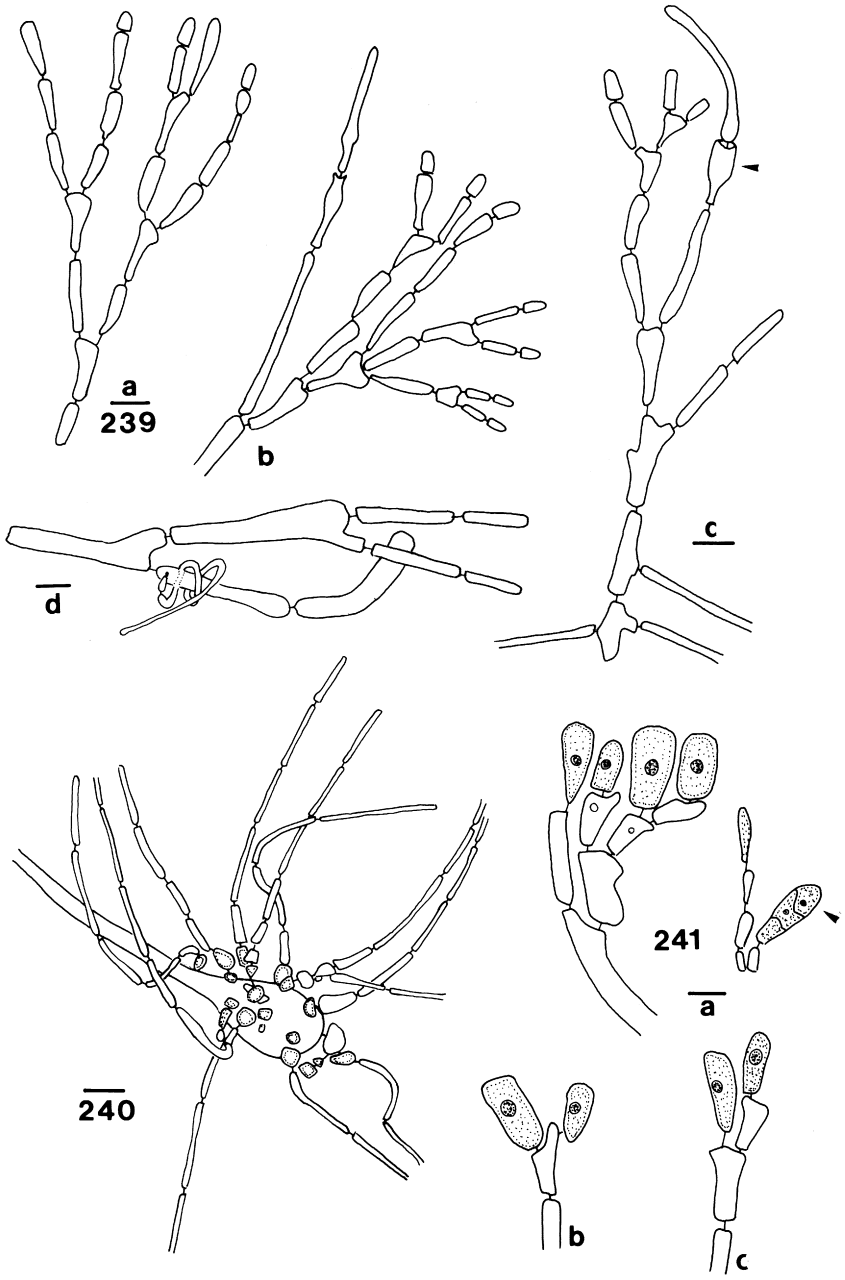


Fig. 239. (*a*) *Renouxia antillana*. Fasciculate assimilatory filaments (SUVA (USP) 1148). Scale bar = 10 µm. (*b, c*) Assimilatory filaments with 2-celled carpogonial branch (arrowhead). Scale bar = 10 µm. (*d*) Coiled connecting filament on young intercalary gonimoblast cell. Scale bar = 10 µm. **Fig. 240.** *Renouxia antillana*. Gourd-shaped gonimoblast cell with multiple connecting filaments (SUVA (USP) 1148). Scale bar = 10 µm. **Fig. 241.** (*a–c*) *Renouxia antillana*. Diffuse gonimoblast filaments with terminal carposporangia or irregularly zonate tetracarposporangia (arrowhead) (SUVA (USP) 1148). Scale bar = 10 µm.

Representative Material Examined

Suva Barrier Reef (*Knight*, 29.ix.1994: SUVA (USP) 1148, *cystocarpic*); Moorea I., French Polynesia (*Orempuller and N'Yeurt*, 12.xii.1995: UPF 95/19).

Thallus light pink, extremely slippery and gelatinous, lightly calcified, eventually turning to chalky white in formaldehyde, attached to the substratum by a discoid holdfast and small stipe to 3 mm wide. Texture with a rugose appearance. Axes 10–15 mm in diameter, thick and irregularly branched with obtuse, non-tapered apices. Structure multiaxial, with fasciculate, pseudodichotomously branched assimilatory filaments consisting of rectilinear cells 4–6 × 16–32 µm and thin-walled rhizoidal filaments 2.5–3 µm in diameter. Calciferous cells scattered in medulla and cortex. Plants dioecious; carpogonial branch 40–60 µm long, 2-celled, with a straight trichogyne. Gonimoblast filaments issued from an elongated, gourd-shaped and intercalary gonimoblast cell 5–20 × up to 312 µm. Up to 10 connecting filaments making lateral superficial contact with the gonimoblast cell, often coiled and with the ends distinctly inflated at point on contact; nutritive cells not seen. Gonimoblast filaments diffusely branched, bearing pairs of terminal, subrectangular to elongate or subspherical carposporangia (or occasionally irregularly zonately divided tetracarposporangia) 5–20 µm in diameter. Spermatia not seen.

Habitat and Remarks

Grows cryptically attached to rocky or coralline substratum on the outer reef slopes at depths of 15–20 m.

The light pink colour, rugose texture and thick, lightly calcified randomly branched axes render this plant easily mistaken for a soft coral. First reported from the Caribbean by Littler *et al.* (1989, p. 166), this species has since been found in French Polynesia (Payri and N'Yeurt 1997), the Solomon Islands (D. S. and M. M. Littler, pers. comm.) and Papua New Guinea (Millar *et al.* 1999) and is probably widely distributed in the Pacific region. Littler and Littler (2000, p. 70) report a second species of *Renouxia* from the Greater Antilles, which is characterised by medullary filaments 7–12 µm in diameter and branching mostly in one plane and thus differs from the Fijian and Tahitian plants examined.

Order **Rhodymeniales** Schmitz in Engler 1892: 19
Family **Champiaceae** Kützing 1843: 438, 439 ('Champieae') emend. G.W.Saunders, I.M.Strachan et Kraft 1999: 35.
Genus ***Champia*** Desvaux 1809: 245

Key to the Suva Lagoon and Reef Species of *Champia*

1. Thallus terete, segments constricted at diaphragms . . . . . *C. parvula*
   Thallus strongly flattened, segments not constricted at diaphragms . . . . . *C. vieillardii*

Champia parvula (C.Agardh) Harvey 1853: 76; Dawson 1954: 443, fig. 52*c*; Price and Scott 1992: 55, fig. 14*A–E*; Abbott 1999*a*: 218, fig. 60*A–C*; Millar *et al.* 1999: 564, fig. 4*C* (Fig. 238)

Basionym and Nomenclatural Synonymy

Chondria parvula C.Agardh 1824: 207 (type locality: Cádiz, Spain).

Fiji and Rotuma Records

Kapraun and Bowden 1978: 201, fig. 28; South and Kasahara 1992: 62; N'Yeurt 1996: 417, fig. 160; N'Yeurt *et al.* 1996*b*: 80.

Representative Material Examined

Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) S11: 14); Fish Patch (*Keats*, 5.viii.1994: SUVA (USP) S11: 18, *tetrasporic*).

Thallus greyish-red to brownish, up to 2 cm high, composed of turgid anastomosing branches up to 0. 5 mm in diameter. Branches terete, tapering and regularly constricted at diaphragms into cask-shaped segments; branch apex obtuse. Cortical layer composed of 2 distinct types of cells, one type ellipsoidal, 20–40 × 50–60 µm, the other smaller and isodiametric 10–12 µm in diameter. Unicellular hairs up to 100 × 6 µm are often present on the thallus, projecting at right angle from certain cortical cells. Tetrasporangia 36–85 µm in diameter, tetrahedrally divided and scattered in cortex. Cystocarps and spermatangia not seen.

Habitat and Remarks

Commonly found as an epiphyte on some coralline algae, or on coral pieces with other turf algae.

Champia vieillardii Kützing 1866: 14, pl. 37, figs *e, f* (type locality: New Caledonia *fide* Grunow 1874: 34); Dawson 1954: 443, figs 52*e*, 53; Millar 1990: 539, fig. 30*E, F*; Price and Scott 1992: 57, figs 15*A–C*, 16*A, B*; Wynne 1995: 285, figs 22–24; Abbott 1999*a*: 218, fig. 60*D–F*; Millar 1999: 511, fig. 36 (Figs 230, 237)

Fiji and Rotuma Records

Kasahara 1985: 63, pl. 12, fig. 1; pl. 16, fig. *D*; N'Yeurt *et al.* 1996*b*: 81.

Representative Material Examined

Fish Patch (*Keats*, 18.v.1994: SUVA (USP) S9: 19); Nukulau I. (*South*, 9.ix.1991: SUVA (USP) S2: 20); Makaluva I. (*Keats*, 19.vii.1994: SUVA (USP) S10: 5).

Thallus up to 2 cm long, strongly flattened and recumbent; faintly segmented, with tapered, obtuse branch apices and tapered subterete base arising from a single encrusting holdfast. Branching alternate to opposite; lateral branches pinnate to bi- or tripinnate, 1.5–3 mm in diameter. Surface tissues distromatic; thallus hollow and interrupted by transverse, unconstricted diaphragms 2 or 3 cells thick at regular intervals. Longitudinal filaments mostly found around the periphery of diaphragms. Cortical layer composed of two distinct types of cells, one type ellipsoidal, 42–50 µm in diameter, the other smaller and isodiametric, 9–22 µm in diameter. Rhizoids uniseriate, on large surface cells. Material sterile.

Habitat and Remarks

Epiphytic on coralline algae, on outer reef slope.

Family **Lomentariaceae** J.Agardh 1876: 606, 630 emend. G.W.Saunders, I.M.Strachan et Kraft 1999: 35.
Genus ***Gelidiopsis*** Schmitz 1895: 148

Key to the Suva Lagoon and Reef Species of *Gelidiopsis*

1. Thallus terete in distal portions, not palmate . . . . . *G. intricata*
   Thallus flattened and palmate in distal portions . . . . . *G. repens*

Gelidiopsis intricata (C.Agardh) Vickers 1905: 61; Price and Scott 1992: 51, fig. 13*A–F*; Abbott 1999*a*: 221, fig. 61*A*

Basionym and Nomenclatural Synonymy

Sphaerococcus intricatus C.Agardh 1822*a*: 333 (syntype localities: Mauritius; Hawaiian Is; 'Ravak' (Lawak); Waigeo I.; Moluccas; Indonesia).

Fiji and Rotuma Records

Kasahara 1985: 60, pl. 9, fig. 4; South and Kasahara 1992: 61; N'Yeurt 1996: 417, fig. 192; N'Yeurt *et al.* 1996*b*: 78.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 16.ix.1985: SUVA (USP) 691-3).

Thallus gregarious, up to 40 mm × 150–350 µm; dark-reddish in colour with entangled, setaceous lower branches; upper parts dichotomously branched, flattened at dichotomies, with no distinct apical cell. Thallus cross-section composed of a medulla of small cells 7–10 µm in diameter, surrounded by a layer of elongated cortical cells 2–5 µm in diameter; loosely packed and ovoid in surface view. Sporangia borne terminally from branchlets, up to 970 × 530–660 µm, spatulate and containing cruciate tetraspores 23–24 µm in diameter.

Habitat and Remarks

Forming clumps in tide pools and beneath rocky ledges.

Gelidiopsis repens (Kützing) Weber-van Bosse 1928: 425, 426; Wynne 1995: 282, 328, fig. 19 (Figs 152, 153*a, b*)

Basionym and Nomenclatural Synonymy

Gelidium repens Kützing 1868: 21, pl. 60, figs *a, b* (type locality: Wagap, New Caledonia).
Ceratodictyon repens (Kützing) R.E.Norris 1987: 245.

Fiji and Rotuma Records

Grunow 1874: 39 (as *Gelidium acrocarpum*); Chapman 1971: 168 (as *Gelidiopsis acrocarpa* ('*acrocarpum*')); N'Yeurt *et al*. 1996: 78.

Representative Material Examined

Fish Patch (*Keats*, 30.xi.1994: SUVA (USP) 1159).

Thallus 10–25 mm high, composed of a rhizomatous system of cylindrical axes giving rise to broadly flattened, deeply divided palmate blades 0.5–1 mm wide and 254–330 µm thick. Structure pseudoparenchymatous throughout, elongate-oval in cross section, with a gradual transition from a dense medulla of clear ovoid to spherical cells 11–20 µm in diameter to an outer cortex of small pigmented subrectangular cells 4–7 µm in diameter. Material sterile.

Habitat and Remarks

Growing in clumps on *Acropora* coral debris, at 15–20-m depth.

The Fijian plants are in very good accord with Børgesen's (1952) fig. 13 and (1954) fig. 7 (both as *G. scoparia*) from Mauritius and Wynne's (1995, p. 283) fig. 19 from the Seychelles.

Gelidiopsis repens is a common and highly variable tropical species. There seems to be at least two forms of this plant in the literature, one delicate with broad flattened portions (as in the Fijian material from Suva) and another larger with filiform extensions to the flat portions (cf. Børgesen 1954, p. 20, fig. 6). Both these and intermediate forms have been observed in collections from Fiji, Rotuma and French Polynesia and they do not seem to merit varietal status as the morphology of the plants appears to be controlled by environmental conditions such as exposure to wave action. In general deep-water and lagoonal thalli tend to have broad flat branches, while those growing on or near the reef crest are more compressed and elongate (A. D. R. N'Yeurt, pers. obs.).

Genus ***Lomentaria*** Lyngbye 1819: 101
Lomentaria corallicola Børgesen 1939: 113, figs 30–32 (type locality: Kharg I., Iranian Gulf; type in C (*Koeie*, 6/3 37)); Price and Scott 1992: 63, fig. 18*A–E* (Figs 223, 224)

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 81.

Representative Material Examined

Fish Patch, Suva Harbour (*Keats*, 5.viii.1994: SUVA (USP) S11: 15).

Plants up to 5 mm long, with arcuate creeping axes 200–260 µm in diameter bearing occasional erect, basally constricted branches 140–200 µm in diameter. Axes and branches generally terete and hollow and composed internally of filamentous inner longitudinal layer and transverse multilayered cellular septa at branch bases; apices rounded. Cortical layer continuous, consisting of cells of variable size; the larger elliptical cells 25–38 × 16–19 µm; the smaller rounded–polygonal cells 4–12 µm in diameter. Plants sterile.

Habitat and Remarks

Epiphytic on coral rubble, mixed with *Ceramium* sp.

Family **Rhodymeniaceae** Harvey 1849: 75, 120 emend. G.W.Saunders, I.M.Strachan et Kraft 1999: 35.
Genus ***Botryocladia*** (J.Agardh) Kylin 1931: 17, *nomen conservandum*

Botryocladia skottsbergii (Børgesen) Levring 1941: 645 (type locality: Easter I.); Dawson 1956: 52, fig. 48; Abbott 1999*a*: 226, fig. 63*A, B* (Figs 232, 233*a, b*)

Basionym

Chrysymenia skottsbergii Børgesen 1924: 307, figs 49, 50 (type locality: Easter I.).

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 81.

Representative Material Examined

Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) S11: 1; 5.viii.1994: SUVA (USP) S10: 20); Fish Patch (*Keats*, 19.viii.1994: SUVA (USP) 788).

Plants 4–18 mm high, basally terete and distally consisting of an ovate to pyriform vesicle 2–2.5 × 3–9 mm. Walls of vesicle 95–116 µm thick, consisting of innermost ovate, colourless cells 30–70 µm in diameter and outermost ovate to subrectangular cortical cells

2.5–4 × 4–11 µm. Gland cells elongate and pyriform, up to 60 µm long, scattered on the inner vesicle wall.

Habitat and Remarks

Attached to *Acropora* coral rubble, at a 5–10-m depth. The conspecificity of *Chrysymenia kuckuckii* and *C. skottsbergii* was proposed by G. Feldmann (1945, pp. 55, 56) and Børgesen (1950. pp. 42–45; see Silva *et al.* 1987, p. 51). The Fijian plants agree well with the description given by Yamada and Tanaka (1938, p. 77).

Genus ***Chamaebotrys*** Huisman 1996: 105
Chamaebotrys boergesenii (Weber-van Bosse) Huisman 1996: 106, figs 35–38, 40–42 (Figs 218, 235, 236)

Basionym and Nomenclatural Synonymy

Coelarthrum boergesenii Weber-van Bosse 1928: 473, figs 207, 208 (syntype localities: Borneo; Saleyer I.; Paternoster I., Indian Ocean); Abbott and Littler 1969: 168, fig. 4.

Taxonomic Synonymy (fide *Abbott and Littler 1969: 168*)

Coelarthrum coactum Okamura and Segawa in Segawa 1936: 186, fig. 7.

Fiji and Rotuma Records

N'Yeurt 1996: 418, fig. 138*a*, *b*; N'Yeurt *et al.* 1996*b*: 81 (both as *Coelarthrum boergesenii*).

Representative Material Examined

Suva Barrier Reef (*Keats*, 30.xi.1994: SUVA (USP) 1177, *tetrasporic*).

Thallus deep-red, erect, up to 35 mm high, composed of hollow, globular dichotomously to trichotomously branched vesicles 2–5 mm high, narrow at the base and rounded at the top. Lateral ramifications and anastomosing of the vesicles common. Wall of vesicles 2-layered, the outer layer continuous and composed of obovoid cells 14–15 µm in diameter; the inner layer of much larger, closely spaced ovoid cells 28–44 µm in diameter. Tetrasporangia cruciately divided and 20–25 µm in diameter, located in nemathecial sori and sometimes making a single connection to an adjacent cell. Cystocarps and spermatangia not seen.

Habitat and Remarks

Growing at a depth of 30 m, at the entrance to Suva Harbour.

Genus ***Halichrysis*** (J.Agardh) Schmitz 1889: 10
Halichrysis coalescens (Farlow) R.E.Norris et Millar in R. E. Norris 1991: 583, 585, 587, figs 7–13; Abbott 1999*a*: 235, fig. 66*A–C* (Figs 220, 221, 234)

Basionym and Nomenclatural Synonymy

Herpophyllon coalescens Farlow 1902: 97, 98 (type locality: Tagus Cove, Albemarle I. (Isla Isabela), Galápagos Is).
Drouetia coalescens (Farlow) De Toni fil. 1938: 27; Millar 1990: 366, 367, figs 28*A–D.*

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 81.

Representative Material Examined

Fish Patch (*Keats*, 27.iv.1994: SUVA (USP) S12: 7; 30.xi.1994: SUVA (USP) 857, S12: 6).

Thallus creamy-pink in colour, consisting of several marginally coalescent, iridescent and mucilaginous blades 2–3 cm in diameter, attached to the substratum by hapteroid holdfasts up to 7 mm long and 1 mm wide. Blades 188–205 µm thick, with a central stalk and one to several marginal or submarginal cortical outgrowths forming secondary attachments to the substratum. Structure pseudoparenchymatous, with a 3- or 4-layered medulla composed of clear ovoid to angular cells 71–114 µm in diameter and a sharply defined cortex of 1–3 layers of progressively smaller pigmented cells 3–9 µm in diameter. Clusters of translucent, spheroidal cells are present subcortically on the dorsal side of the thallus. Reproduction not seen.

Habitat and Remarks

Growing at 10–15-m depth, on coralline substratum. The taxonomy of the genus *Halichrysis* was revised by Huvé and Huvé (1977), Eiseman and Moe (1981), Millar (1990) and Norris (1991).

Genus ***Sciadophycus*** Dawson 1945: 105
?Sciadophycus sp. (Figs 206, 207)

Fiji and Rotuma Records

N'Yeurt 1997.

Representative Material Examined

Fish Patch (*Brooks*, 21.iii.1996: SUVA (USP) 1181).

Thallus 4–5 cm across, dorsiventral, consisting of irregularly lobed blades 7–11 mm wide and 530–645 µm thick. Bladed deep red in colour and iridescent when fresh, attached to the substratum via multiple long flagellate holdfasts 5–6 mm long, terminating in peltate discs 0.7–1 mm in diameter. Primary holdfast not prominent. Structure pseudoparenchymatous, with a monostromatic medulla consisting of large ovoid to subrectangular clear cells 178–320 µm in diameter. Cortex 1–3-layered, with outermost cells anticlinal and pigmented, about 10 µm in diameter. Inner cortical cells less pigmented, elongate–ovoid, 57–75 µm in diameter. Plant sterile.

Habitat and Remarks

Growing on coralline algae, at 33–40-m depth.

This deep-water species is superficially similar to *Fauchea peltata* Taylor (now transferred to the genus *Asteromenia* Huisman et Millar (1996, p. 138)) but differs in having a monostromatic medulla and the lack of a prominent stipe. Similarly, its monostromatic medulla separates the Fijian species from such genera as *Callophyllis* and *Halichrysis*. Allen and Steene (1994, p. 22) report an Indo-Pacific species (under *Fauchea peltata*) that looks similar to the Fijian material and could be the same entity. Until reproductive stages are found, the species is tentatively ascribed to the genus *Sciadophycus* Dawson based on structural similarities. The genus *Sciadophycus* is characterised by a dorsiventral and flattened thallus, with formation of secondary attachments to substratum and other thalli via terete hapteroid organs and sympodially developed secondary blades. The medulla is monostromatic and carposporophyte possess a distinctive *tela arachnoidea* while

tetrasporangia are terminal, in nemathecia (Millar, unpubl. data). The Fijian species differs from the type species (*S. stellatus* Dawson) by its non-peltate or stellate habit lacking a prominent stipe. However, the apparent lack of sympodially derived secondary blades on the Fijian plant suggests that it may not belong to the genus *Sciadophycus* but could be closer to *Rhodymenia* (Millar, *in lit*.) and further work is clearly needed.

Family **Ceramiaceae** Dumortier 1822: 71, 100
Tribe **Antithamnieae** Hommersand 1963: 330
Genus ***Balliella*** Itono et Tanaka 1973: 249

Balliella subcorticata (Itono) Itono et T.Tanaka 1973: 250, figs 1, 2 (Fig. 252)

Basionym

Antithamnion subcorticatum Itono 1969: 40, fig. 7*A–D* (type locality: Yoron-jima, Okinawa-gunto, Ruykyu-retto, Japan).

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 82.

Representative Material Examined

Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) 766, S10: 18, S10: 19).

Thalli deep red in colour, uniaxial and up to 30 mm high. Branching opposite, with the unequal pairs of lateral branches being issued from each axial cell. Main axis up to 50 µm in diameter, tapering to 10–20 µm in the upper portions of the thallus. Lax pseudocortication sometimes formed via the production of rhizoid-like filaments from the basal cell of lateral branches. Gland cells spherical, up to 15 µm in diameter and produced from the basal cell of lateral branches, mostly so at the indeterminate branches.

Habitat and Remarks

Growing on coral debris, at a depth of 10–15 m on the outer reef slope.

Tribe **Ceramieae** (Dumortier) Schmitz 1889: 451
Genus ***Ardreanema*** Norris et Abbott 1992: 453

Ardreanema seriospora (Dawson) R.E.Norris 1994: 154; Abbott 1999*a*: 255, fig. 71*E–G* (Figs 242–248, 275)

Basionym

Ceramium seriosporum Dawson 1963*a*: 13, pl. 4, figs 1–6 (type locality: 'Epiphytic on crustose corallines with *Antithamnion veleroae* Taylor, intertidal on the seaward side of Isla Cuamaño, Academy Bay, Santa Cruz I., Galapagos Archipelago).

Taxonomic Synonymy

Ardreanema farifructa Norris et Abbott 1992: 453, figs 1–4 (type locality: on encrusting coralline red algae on lava rock, south of Kealakekua Bay, Kona District, Hawai'i).

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 81.

Representative Material Examined

Makaluva I. (*Keats*, 26.v.1994 : SUVA (USP) S11: 3; S11: 4).

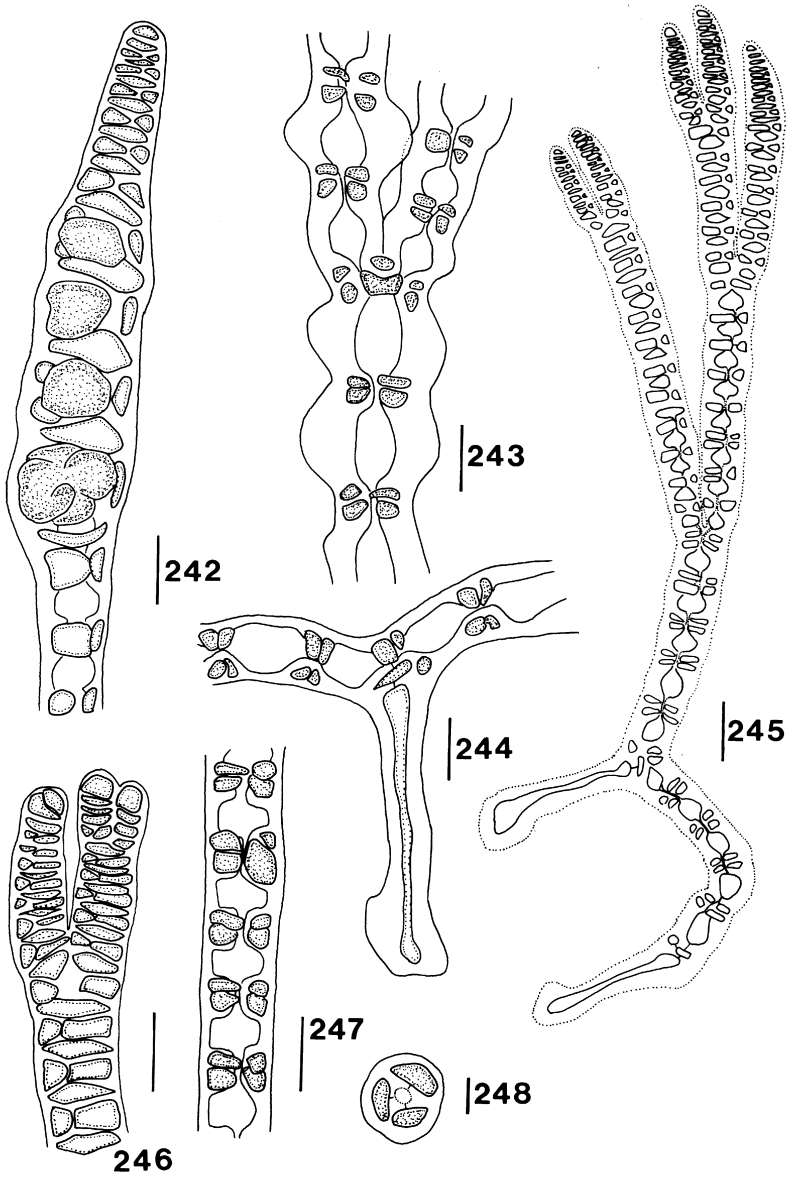


Fig. 242. *Ardreanema seriospora*. Apex of fertile thallus, showing tetrasporangia arranged in a series of nodes (SUVA (USP) S11: 3). Scale bar = 25 µm. **Fig. 243.** *Ardreanema seriospora*. Detail of cortication in lower portion of sterile thallus (SUVA (USP) S11: 3). Scale bar = 25 µm. **Fig. 244.** *Ardreanema seriospora*. Detail of unicellular rhizoid on ventral side of decumbent branchlet (SUVA (USP) S11: 3). Scale bar = 25 µm. **Fig. 245.** *Ardreanema seriospora*. Habit of sterile thallus (SUVA (USP) S11: 3). Scale bar = 50 µm. **Fig. 246.** *Ardreanema seriospora*. Apex of sterile branchlet (SUVA (USP) S11: 3). Scale bar = 25 µm. **Fig. 247.** *Ardreanema seriospora*. Detail of cortication in upper portion of sterile thallus (SUVA (USP) S11: 3). Scale bar = 25 µm. **Fig. 248.** *Ardreanema seriospora.* Transverse section of thallus at node, showing central axial cell surrounded by three pericentral cells (SUVA (USP) S11: 3). Scale bar = 12 µm.

Thallus up to 1 mm high and 23–50 µm in diameter, monopodial with pseudodichotomous branching and attached to the substratum via unicellular rhizoids up to 120 × 13–18 µm arising from the ventral side of decumbent branches. Branch apices straight with the apical cell dividing transversely to give rise to segment cells, each of which in turn gives rise to an axial cell and three pericentral cells. Axial cells ellipsoidal to cylindrical, 13–17 µm in diameter and up to twice as long as broad. Pericentral cells 3, 6 × 11–7 × 17 µm in dimension, attached distally to the axial cell at each node and each giving rise to 1 or 2 acropetal branches of limited growth (corticating filaments) composed of one or two ellipsoidal to rectangular apical cells. Basipetal branches of limited growth absent. Cortical band (nodal length) 11–13 µm, smooth at the edges. Internodal length 11–31 µm, approximately equal to nodal length except in decumbent portions of the thallus. Tetrasporangia up to 40 µm in diameter, tetrahedrally divided, arranged singly in a series of nodes close to branch apices. Spermatangial and carposporic plants not seen.

Habitat and Remarks

Epiphytic on coralline red alga (*Hydrolithon* sp.) in a semi-exposed channel at Makaluva Island (Suva Barrier Reef), at 4–5-m depth.

The Fijian plants agree closely with the original description for *A. seriospora* by Dawson (1963*a*) and Norris and Abbott (1992) and represent the first report of the species from the Southern Hemisphere. Although no carposporic Fijian specimens were found, the tetrasporic and sterile plants agree closely with the description of the genus by Norris and Abbott (1992), in particular concerning the presence of three pericentral cells and tetrasporangia occurring in a series of nodes near the branch apex. Photomicrographs of the Fijian material were sent to Norris and Abbott, who agreed on its identification based on vegetative and tetrasporic characters (Norris; Abbott, *in lit*.).

Genus ***Centroceras*** Kützing 1841: 731

Key to the Suva Lagoon and Reef Species of *Centroceras*

1. Thallus less than 10 mm high; apices not forcipate . . . . . *C. minutum*
   Thallus more than 10 mm high; apices forcipate . . . . . *C. clavulatum*

Centroceras clavulatum (C.Agardh) Montagne 1846: 140; Dawson 1954: 446, fig. 54*b*; Millar 1990: 390, fig. 40*E–G*; Price and Scott 1992: 81, fig. 25*A–E*; Abbott 1999*a*: 261, fig. 73*A–F*

Basionym and Nomenclatural Synonymy

Ceramium clavulatum C.Agardh 1822*b*: 2 (type locality: Callao, Peru).

Fiji and Rotuma Records

Grunow 1874 ('var. *hyalcanthum* Kützing'); Chapman 1971: 170; South and Kasahara 1992: 63; N'Yeurt 1996: 421, fig. 199; N'Yeurt *et al.* 1996*b*: 82.

Representative Material Examined

Nasese (*South*, 22.ix.1991: SUVA (USP) S8: 10; 29.ix.1991: SUVA (USP) S2: 4); Suva Point (*South*, 7.vii.1990: SUVA (USP) 456, 461; 18.xi. 1993: SUVA (USP) 641).

Thallus dark brownish-maroon, up to 30 × 120–128 µm; branching dichotomous with incurved forcipate apices. Thallus segmented; nodes with verticillate spines 1 or 2 cells

long imparting characteristic light-and-dark banding pattern to axis. Internodes 135–150 µm long in mid-thallus. Specimens sterile.

Habitat and Remarks

Commonly found as entangled tufts or balls intertidally and subtidally, on rock or coral substratum.

Centroceras minutum Yamada 1944: 42 (type locality: Ant Atoll, near Ponape, Caroline Is); Dawson 1956: 54, fig. 54; Ardré 1987: 285, figs 30–37; Wynne 1993: 12, fig. 7; 1995: 290, fig. 27; Abbott 1999*a*: 262, fig. 73*H, I* (Figs 249, 250)

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 82 (as *Centroceras clavulatum*).

Representative Material Examined

Nukulau I. (*South*, 9.ix.1991: SUVA (USP) 434, S1: 19, *tetrasporic*); Ant Atoll, Ponape, Caroline Is (*Yamada*, xii.1939: *in Herb.* SAP, *holotype*).

Thallus to 10 mm high and 71–100 µm thick, sparsely branched with non-forcipate apices. Cortication found throughout the axes, with elongate rectangular cortical cells 9–10 × 15–29 µm arranged in longitudinal rows. Internodal distance 100–170 µm; internodes 70–80 µm thick; cortical cells at nodes subspherical to quadrate, 8–10 µm in diameter. Nodes with colourless, 2- or 3-celled spines 11–16 × 55–93 µm. Nodal tetrasporangia shortly pedicellate, 44–46 µm in diameter, non-involucrate and tetrahedrally divided. Carposporophyte and spermatangia not seen.

Habitat and Remarks

Growing on the reef flat, associated with *Jania*. Ardré (1987, p. 287) considered *C. minutum* a morphological variation of *C. clavulatum* (C.Agardh) Montagne, but Wynne (1993, p. 12; 1995, p. 290) argued for its distinctness based on the smaller stature, lack of forcipate apices, non-dichotomous branching and smaller internodal thickness of *C. minutum*. The Fijian material was found to be in good agreement with the slide-mounted holotype of *C. minutum* Yamada held in the herbarium at SAP, whose internodal thickness ranges from 80–107 µm (this preparation is fragmentary and also contains some spineless *C. apiculatum*). There is a clear distinction between Fijian *C. minutum* and *C. clavulatum*; the latter being larger, with regular dichotomous branching and forcipate apices.

Genus ***Ceramium*** Roth 1797: 146

Five species of *Ceramium* are reported from the Suva (N'Yeurt *et al.* 1996*b*). Only the commonest species are described here, but a full treatment of the *Ceramium* species from Fiji and Samoa is given in South and Skelton (2000).

Key to the Suva Lagoon and Reef Species of *Ceramium*

1. Apices forcipate ..... *C. zacae*
   Apices non-forcipate ..... *C. flaccidum*

Ceramium flaccidum (Kützing) Ardissone 1871: 40; Womersley 1978: 234, figs 4*A–D*, 14*E–H*; Cribb 1983: 82, pl. 31, fig. 2, pl. 59, figs 1–4; Price and Scott 1992: 89, fig. 27*A–E*; Abbott 1999*a*: 274, fig. 76*D–H*; South and Skelton 2000 (Fig. 253)

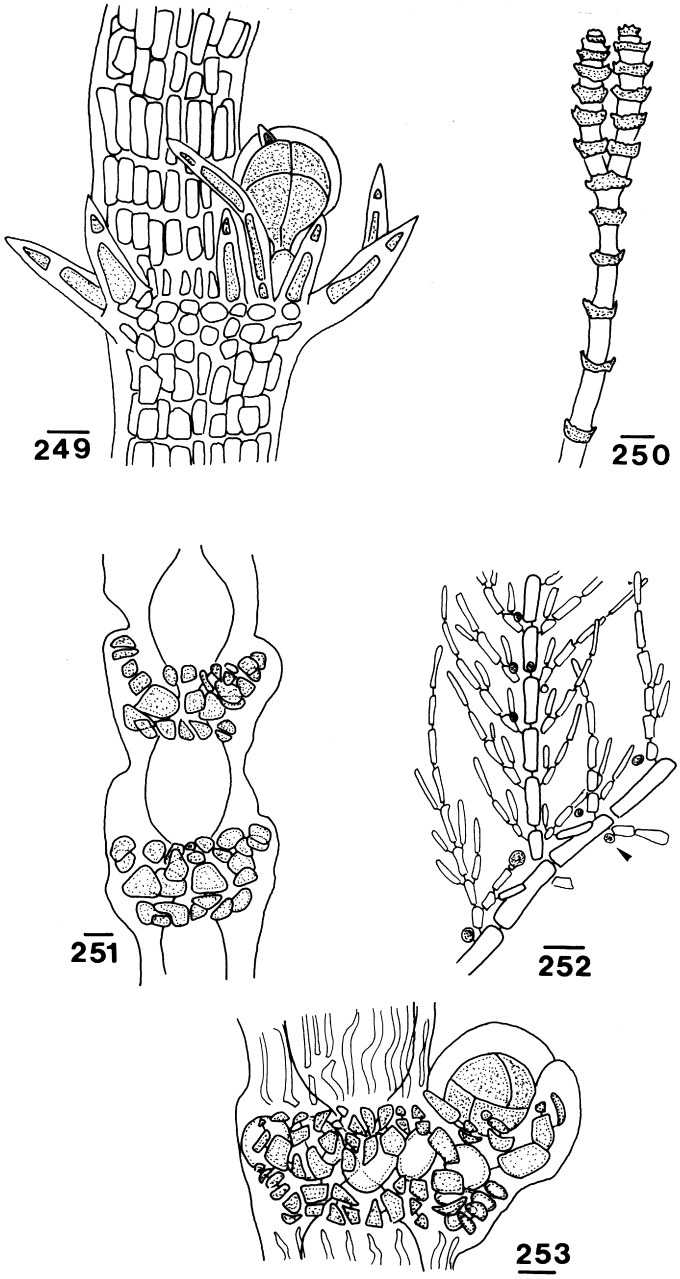


Fig. 249. *Centroceras minutum*. Nodal region showing multicellular spines and pedicellate tetrasporangia (SUVA (USP) S1: 19). Scale bar = 20 µm. **Fig. 250.** *Centroceras minutum*. Habit (SUVA (USP) S1: 19). Scale bar = 100 µm. **Fig. 251.** *Ceramium zacae*. Detail of nodal cortical bands (SUVA (USP) S11: 15). Scale bar = 20 µm. **Fig. 252.** *Balliella subcorticata*. Main and lateral axes with spherical gland cells (arrowhead) (SUVA (USP) S10: 18). Scale bar = 20 µm. **Fig. 253.** *Ceramium flaccidum*. Nodal band with tetrasporangia (SUVA (USP) S11: 7). Scale bar = 20 µm.

Basionym and Nomenclatural Synonymy

Hormoceras flaccidum Kützing 1862: 21, pl. 69, figs *a–d* (type locality: Kilkee, County Clare, Ireland).

Fiji and Rotuma Records

Kasahara 1985: 65, pl. 12, fig. 3 (as *C. masonii*); Garbary *et al.* 1991: 254 (as *C. gracillimum* var. *byssoideum*); South 1991: 8 (as *C. masonii*); N'Yeurt *et al.* 1996*b*: 82; South and Skelton 2000.

Representative Material Examined

Makaluva I. (*Keats*, 11.viii.1994: SUVA (USP) S11: 7, S11: 8); Suva Barrier Reef (*South*, 6.v.1993: SUVA (USP) S8: 20).

Thallus up to 20 mm high, composed of prostrate and erect axes; erect axes 90–100 µm in diameter, with unequal pseudodichotomous branching; attached to substratum via unicellular rhizoids issued from prostrate axes and base of erect axes; erect axes with non-forcipate apices. Axial cell 75–80 µm in diameter, with 4 or 5 periaxial cells 27–32 µm in diameter, each with a single basipetal filament composed of transversely elongate cells 12–15 µm wide; filaments arranged in more or less distinct transverse rows only in proximal portion of cortical band. Nodal tetrasporangia spherical, 45–50 µm in diameter, partly involucrate, unilateral and strongly protruding.

Habitat and Remarks

Epiphytic on other algae and coral.

Ceramium zacae Setchell et Gardner 1937: 89, pl. 8, figs 22*a–c* (type locality: Bahía San Bartolomé (Bahía Tortugas), Baja California Sur, Mexico); Dawson 1950: 134, pl. 2, figs 27, 28; 1962: 67, pl. 26, figs 4–6 (Fig. 251)

Fiji and Rotuma Records

N'Yeurt 1996: 423, figs 152, 153, 164; N'Yeurt *et al.* 1996*b*: 83; South and Skelton 2000.

Representative Material Examined

Fish Patch (*Keats*, 5.viii.1994: SUVA (USP) S11: 15); Suva Point (*N'Yeurt*, 3.x.1992: SUVA (USP) S7: 3).

Thallus epiphytic, up to 5 mm high and 90–100 µm in diameter, arising from prostrate filaments adhering by rhizoids from ventral nodal surfaces. Branching dichotomous, with forcipate apices. Cortical band 57–60 µm in diameter and 4 or 5 rows wide, smooth at the margins and somewhat elongated and irregular acropetally; truncate basipetally. Axial cells ovoid; internodal areas 97–100 µm long. Nodal cortication orderly and precise; periaxial cells 6–8, giving rise acropetally to 2 rows of progressively smaller derivatives and basipetally to 1 or 2 rows of triangular to subrectangular derivatives. Plants sterile.

Habitat and Remarks

Growing intertidally as an epiphyte on rocks and seagrasses (e.g. at Suva Point), or subtidally on coral debris. The type material of this species having been lost, verification of the Fijian records is not possible, although the plants are in good agreement with Dawson's (1962) description of the species, particularly the orderly arrangement of nodal cortical cells (South and Skelton 2000).

Tribe **Ptiloteae** Cramer 1864: 106
Genus ***Euptilota*** (Kützing) Kützing 1849: 671

Euptilota articulata (J.Agardh) Schmitz 1896: 7; Womersley 1998: 355, pl. 2, fig. 2, figs 141*E*, 164, 165; Millar 1999: 515, fig. 38 (Figs 254–263)

Basionym and Nomenclatural Synonymy

Ptilota articulata J.Agardh 1841: 36 (type locality: 'ad oras Novae Hollandiae').

Taxonomic Synonymy (sensu *Womersley 1998*: *355*)

Euptilota coralloidea (J.Agardh) Kützing 1849: 672 (type locality: 'ad oras Novae Hollandiae').

Fiji and Rotuma Records

N'Yeurt 1997: 284.

Representative Material Examined

Fish Patch (*Keats*, 1.xii.1994: SUVA (USP) 1162, S14: 18, 19, *tetrasporic*).

Thallus 5–6 cm high, erect to decumbent, regularly alternately branched with up to 5 or 7 orders of progressively shorter branches. Main axes 1–1.2 mm in diameter, decreasing to 330 µm in fourth-order branches; heavily corticated in plane of branching with cortical filaments connecting laterals of alternating segments. Cortical cells irregularly angular and generally elongate, 4–15 µm in diameter. Fourth order laterals up to 1.4 mm long, further alternately divided 2 or 3 times. Laterals generally of irregular length, but tending to have progressively smaller higher-order laterals near the base and apex, with the longest in the middle section. Structure uniaxial, but appearing multiaxial due to the production of basipetal filaments of large corticating cells parallel to the axial filament by alternate periaxial cells. Axial cells subcylindrical, 70–100 × 200–270 µm, connected by pit connections with prominent cap layers about 20 µm wide. Each successive axial cell gives rise in alternate sequence to a single periaxial cell 100–110 µm in diameter, which further divides to give rise to a lateral branchlet perpendicular to axial filament and a row of three large corticating cells 90–100 × 100–128 µm basipetally and parallel to the axial filament. The first cell of each lateral branchlet gives rise laterally and basipetally to a row of small elongate cortical cells, which eventually connect to the first cell of the lower lateral. Tetrasporangia 34–51 µm in diameter, cruciately divided and shortly pedicellate, sparsely clustered on penultimate laterals; involucres not present. Tetrasporic laterals usually with some terminal trichoblasts 57–86 × 6–12 µm. Cystocarps and spermatangia not seen.

Habitat and Remarks

Growing at a depth of 30 m, in shady overhangs.

This species agrees well with *Euptilota articulata* (J.Agardh) Schmitz as described by Itono (1977, p. 139) from Southern Japan. In habit it also approaches *Compsothamnionella sciadophila* Stegenga (1990, p. 94, figs 1, 2) but differs in being larger and having a much more developed cortication of the main axes, with higher orders of alternate branching. Superficially this species bears a resemblence to members of the Dasyphilae, but a comparison of the Suva material with *Dasyphila plumarioides* from the Great Astrolabe Reef (fig. 330) clearly shows the more simple axial filament derivatives of *Euptilota*.

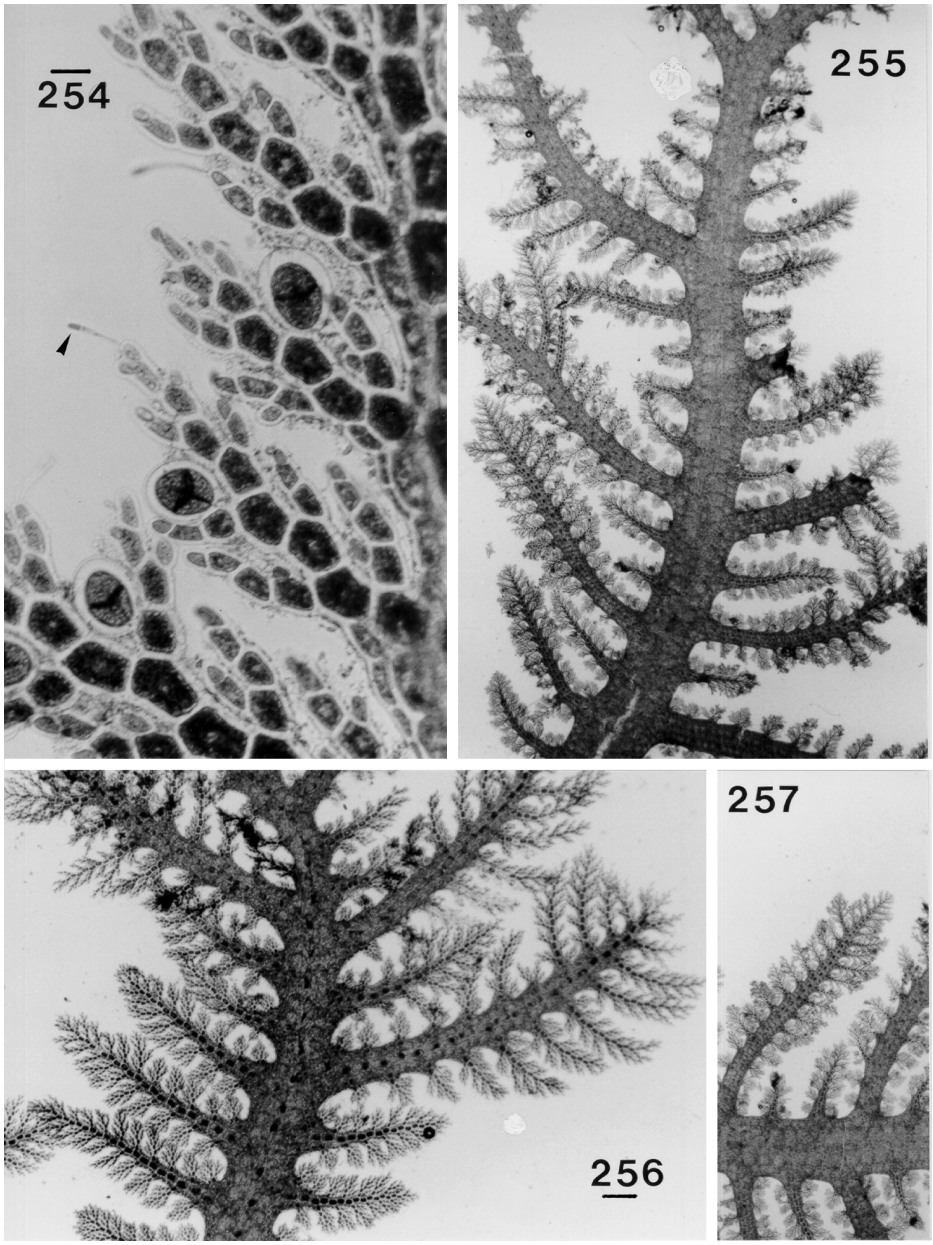


Fig. 254. *Euptilota articulata*. Ultimate branchlets with cruciately divided tetrasporangia and terminal hair cells (arrowhead) (SUVA (USP) S14: 18). Scale bar = 35 µm. **Figs 255–257.** *Euptilota articulata*. Habit ((SUVA (USP) S14: 18). Scale bar = 500 µm.

Tribe **Griffithsieae** Schmitz 1889: 449
Genus ***Griffithsia*** C.Agardh 1817: 28

Griffithsia subcylindrica Okamura 1930 (1929–1932): 99, pl. 8; Millar 1990: 411, fig. 50*E, F*; Price and Scott 1992: 125, fig. 42*A, B*; Abbott 1999*a*: 302, fig. 85*C, D*

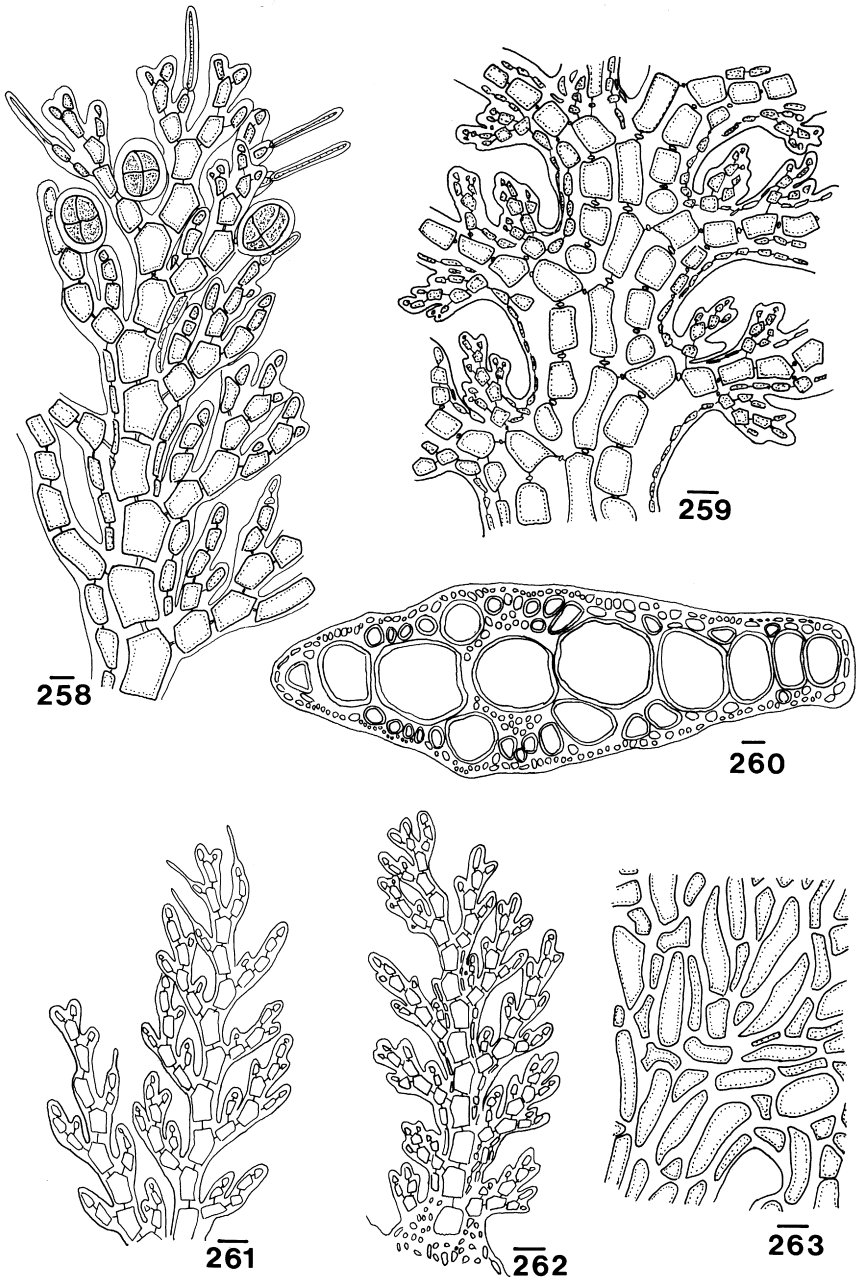


Fig. 258. *Euptilota articulata*. Habit of tetrasporic ultimate branchlet (SUVA (USP) S14: 18). Scale bar = 20 µm. **Fig. 259.** *Euptilota articulata*. Optical section of main axis, showing axial cell filament cutting off alternate periaxial cells which in turn give rise to basipetal corticating filaments (SUVA (USP) S14: 18). Scale bar = 100 µm. **Fig. 260.** *Euptilota articulata*. Cross-section of main axis (SUVA (USP) S14: 18). Scale bar = 100 µm. **Figs 261, 262.** *Euptilota articulata*. Ultimate branchlets (SUVA (USP) S14: 18). Scale bar = 100 µm. **Fig. 263.** *Euptilota articulata*. Surface cells of main axis (SUVA (USP) S14: 18). Scale bar = 20 µm.

Fiji and Rotuma Records

N'Yeurt 1996: 424, fig. 168; N'Yeurt *et al.* 1996*b*: 83.

Representative Material Examined

Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) S10:16).

Thallus light purple to red, up to 10 mm long; moniliform, 160–300 µm in diameter, branching irregularly lateral. Cells ellipsoidal to subcylindrical, about 70 × 170 µm in middle of thallus. Basal rhizoidal filaments up to 50 µm in diameter, spaced at 50–170-µm intervals. Apical cells about 18 × 125 µm. Plants sterile.

Habitat and Remarks

Growing with other turf algae on coral substratum, in subtidal habitat.

Tribe **Spermothamnieae** Schmitz 1889: 449
Genus ***Ptilothamnion*** Thuret ex Le Jolis 1863: 118

Ptilothamnion schmitzii Heydrich 1893: 75, pl. 22, figs 1–6 (type locality: Bay of Is, New Zealand); Gordon 1972: 133, figs 42*G–J*, 43 (Figs 264–274)

Fiji and Rotuma Records

N'Yeurt 1997: 288.

Representative Material Examined

Fish Patch, Suva Barrier Reef (*Brooks*, 21.iii.1995: SUVA (USP) S13: 8, *tetrasporic*, S13: 9, *procarpic and cystocarpic*).

Thallus with sparingly branched prostrate axes 21–23 µm in diameter, attached to *Cladophora* host via digitate haptera 40–41 µm in diameter, giving rise perpendicularly to sparingly branched erect axes 16–20 µm in diameter (in median portions) and 0.9–2 mm high, with obtuse slightly tapering apices 13–14 µm in diameter. Prostrate axial cells 21–23 × 78–86 µm, or 3 or 4 times as long as wide. Median cells of erect axes 16–20 × 32–40 µm, or 2 or 3 times as long as wide.

Procarps occur on the subapical cell of erect axes and are enveloped in a gelatinous sheath. The hypogenous cell is of same size as other lower cells of fertile axis, giving rise to a pair of 1- or 2-celled lateral branchlets only after fertilisation has taken place. The subapical cell of the procarp measures about 11–12 × 1.8–3 µm and gives rise laterally to 2 sterile pericentral cells 9–10 µm in diameter and a supporting cell about 8–9 µm in diameter. The apical cell measures about 8–10 × 6–7 µm. The supporting cell bears a sterile terminal cell about 9–10 µm in diameter and a lateral 4-celled carpogonial branch 23–25 µm long. All cells of the carpogonial branch are of about the same size, 6–7 µm in diameter, with the mature trichogyne measuring up to 70 × 4–5 µm.

After presumed fertilisation, the trichogyne falls off and the cells of the carpogonial branch fuse, while the auxiliary cell produced from the supporting cell cuts off up to five uninucleate gonimoblast initials which divide subdichotomously once or twice and produce terminal carposporangia 13–15 µm in diameter. No fusion occurs between the lower gonimoblast cells or subapical cell; 2 or 3 lateral involucral filaments 8–12 cells long are produced from the hypogenous cell, curving around the early gonimoblast. The tetrahedrally divided tetrasporangia measure about 34–44 µm in diameter and are shortly pedicellate on the erect axes. Spermatia not seen.

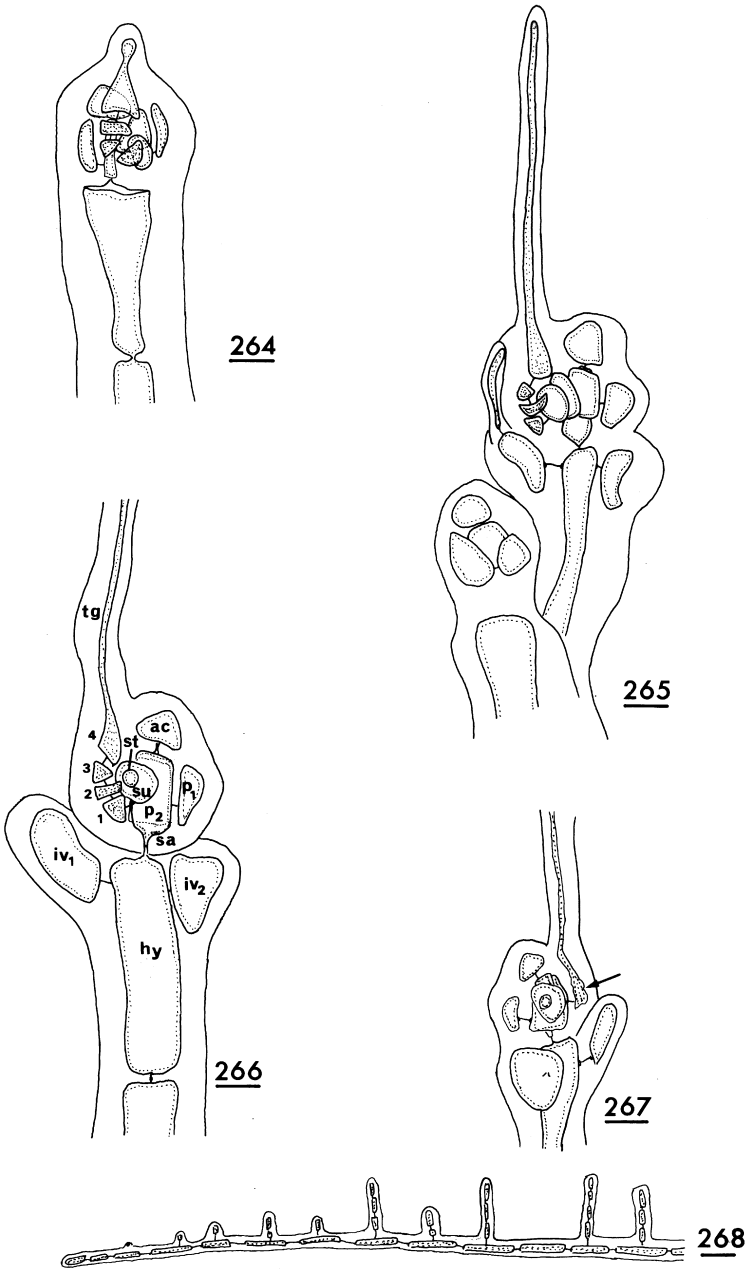


Fig. 264. *Ptilothamnion schmitzii*. Pre-fertilisation procarp system on subapical cell of erect axis (SUVA (USP) S13: 9). Scale bar = 10 µm. **Figs 265, 266.** *Ptilothamnion schmitzii*. Four-celled carpogonial branch system and associated cells (SUVA (USP) S13: 9). See text for explanation. ac = apical cell; hy = hypogenous cell; iv_n = lateral involucral branchlet initials; p_n = pericentral cells; sa = subapical cell; st = sterile terminal cell of supporting cell; su = supporting cell; tg = trichogyne. Scale bar = 10 µm. **Fig. 267.** *Ptilothamnion schmitzii*. Early post-fertilisation stage, showing fused carpogonial branch (arrow) (SUVA (USP) S13: 9). Scale bar = 10 µm. **Fig. 268.** *Ptilothamnion schmitzii*. Habit of adventitious prostrate axis (SUVA (USP) S13: 9). Scale bar = 100 µm.

Habitat and Remarks

Epiphytic on an unidentified ?*Cladophora* sp., at 40-m depth on the outer reef wall.

The fertile and vegetative material fully agrees with the description by Gordon (1972) and appears to be the first tropical record of this species. It is interesting to note that this species was previously only reported as an epiphyte of *Zonaria* (both in New Zealand and Australia). The Fijian material is of the sparingly branched form described as creeping over the fronds of *Zonaria crenata* in southern Australia (Gordon 1972, p. 133). No secondary pit connections were seen to occur between the prostrate axes.

Tribe **Wrangelieae** Schmitz 1889: 439
Genus ***Wrangelia*** C.Agardh 1828: 136

Wrangelia argus (Montagne) Montagne 1856: 444; Dawson 1954: 444, fig. 54*g*; Price and Scott 1992: 134, fig. 46*A–E*

Basionym and Nomenclatural Synonymy

Griffithsia argus Montagne 1841 (1839–1842): 176, pl. 8, fig. 4 (type locality: Roque del Gando, Islas Canarias).

Fiji and Rotuma Records

Kasahara 1985: 65, pl. 12, fig. 5; Garbary *et al.* 1991: 256; South 1991: 8; South and Kasahara 1992: 64; N'Yeurt 1996: 424, figs 167, 169–172; N'Yeurt *et al.* 1996*b*: 83.

Representative Material Examined

Makaluva I. (*Keats*, 26.vii.1994: SUVA (USP) S11: 10); Suva Barrier Reef (*South*, 6.v.1993: SUVA (USP) S9: 3).

Plants in turf-like colonies, purple red with a slight iridescence; 5–7 mm high and 1.5–1.8 mm broad, plumosely branched in two indistinct ranks. Main axis 41–58 µm in diameter, uncorticated with determinate lateral branchlets 17–24 mm in diameter terminating in attenuate cells. Tetrasporangia 55–60 µm in diameter, surrounded by short-celled involucral filaments.

Habitat and Remarks

Grows as a downy turf on coral pieces and rocks, along with other Ceramiales and algae.

Family **Dasyaceae** Kützing 1843: 413, 414
Genus ***Thuretia*** Decaisne 1843: 236

Thuretia sp. (Figs 276–280, 283)

Fiji and Rotuma Records

N'Yeurt 1997: 292.

Representative Material Examined

Belcher Rocks, Suva Reef (*Keats*, 27.xi.1994: SUVA (USP) 1175, S15: 1; *N'Yeurt*, 18.viii.1998: SUVA (USP) 5524); Neds Beach, Lord Howe I. (*Gabrielson and Kraft*, 24.i.1982: SUVA (USP) 1176, ex. MELU). *Dictyurus purpurascens*: north end of Aniyaanii I., Enewetak Atoll (*Dawson*, 22.viii.1955, D.13773, in BISH); Tufa I., Bikini Atoll (*Smith*, 16.vii.1946: MICH 22185).

Thallus 5–7 cm high, reddish brown, sympodially branched with flattened, smooth-edged ultimate axes invested with a dense compressed monosiphonous network 3–5 mm broad, 0.5–1 mm thick and 6–40 mm long. Sympodial axis terete, 1–1.2 mm in diameter, pseudoparenchymatous with a central axial cell about 100 µm in diameter surrounded by a medulla of subspherical cells 83–130 µm in diameter. Outermost cortical cells 16–25 µm in diameter, irregularly angular in surface view. Cells of reticulate network subrectangular to ovoid, 38–76 µm in diameter. Mesh of network 75–170 µm wide, with 2–4-celled marginal spines 25–80 µm long. Network never quadrangular or in a spiral arrangement. Reproduction not seen.

Habitat and Remarks

Growing on rocks and pebbles, 3–10-m depth.

The Fijian material is identical to plants collected at Lord Howe Island housed in MELU (G. T. Kraft, pers. comm.) and material from Lord Howe Island housed in SUVA (USP 1176) examined by the author. While no fertile Fijian material was found, the likelihood of discovering the plants in a state of reproduction is slim as no fertile specimens were found in fifteen years of collecting over 200 plants at Lord Howe Island (ibid.). The Fijian and Lord Howe specimens have branches that are rather flattened and would tend to agree with the vegetative criteria for the genus *Thuretia* (Falkenberg 1901, p. 671; Parsons 1975, p. 635) rather than superficially similar *Dictyurus*. The male 'arrhenophores' on compound branch structures of *Dictyurus* (Bory de Saint-Vincent 1834, p. 170) are unique (Svedelius and Nygren 1946, p. 13, fig. 7) and would be decisive in the placement of the Fijian plants if fertile material is eventually found. After examination by the author of the respective voucher specimens housed in MICH and BISH, true *Dictyurus purpurascens* with quadrangular, spiral arrangement of the network is confirmed to occur in Bikini Atoll (Taylor 1950, p. 143, pl. 78, fig. 1) and the Marshall Islands (Dawson 1956, p. 57; 1957, p. 123). True *Dictyurus* is also reported from southern Japan (Tanaka 1964, p. 81, fig. 8) and Norfolk Island (Millar 1999, p. 518, fig. 45) and would support the case that the Fijian, Lord Howe and Norfolk plants belong to a different genus. Vegetatively, *D. purpurascens* has terete, mostly simple serrated axes with a spirally arranged network that differs from the flattened, smooth-edged and much alternately distichously branched axes of the Fijian and Lord Howe plants. Further work on the Fijian and Lord Howe plants will be published elsewhere.

Family **Delesseriaceae** Bory 1828: 181
Genus ***Hypoglossum*** Kützing 1843: 444

Key to the Suva Lagoon and Reef Species of *Hypoglossum*

1. Thallus catenate; strongly epiphytic, not spreading, decumbent or erect . . . . . *H. caloglossoides*
   Thallus spreading, decumbent or erect; not catenate or epiphytic 2
2. Thallus decumbent and spreading; blades small, 7–10 mm long and up to 1.6 mm wide; first and second derived periaxial cell in distinct longitudinal rows; lateral branches issued singly from midrib . . . . . *H. simulans*
   Thallus erect from basal holdfast; blades large, up to 16 mm long and 3.5 mm wide; first and second derived periaxial cell not in distinct longitudinal rows; lateral branches issued in pairs from midrib . . . . . *H. geminatum*

Hypoglossum caloglossoides Wynne and Kraft 1985: 20, figs 1–19 (type locality: Lord Howe I., Australia); Price and Scott 1992: 137, fig. 47*A–C*; Abbott 1999*a*: 337, fig. 97*B, C* (Figs 285, 287, 288)

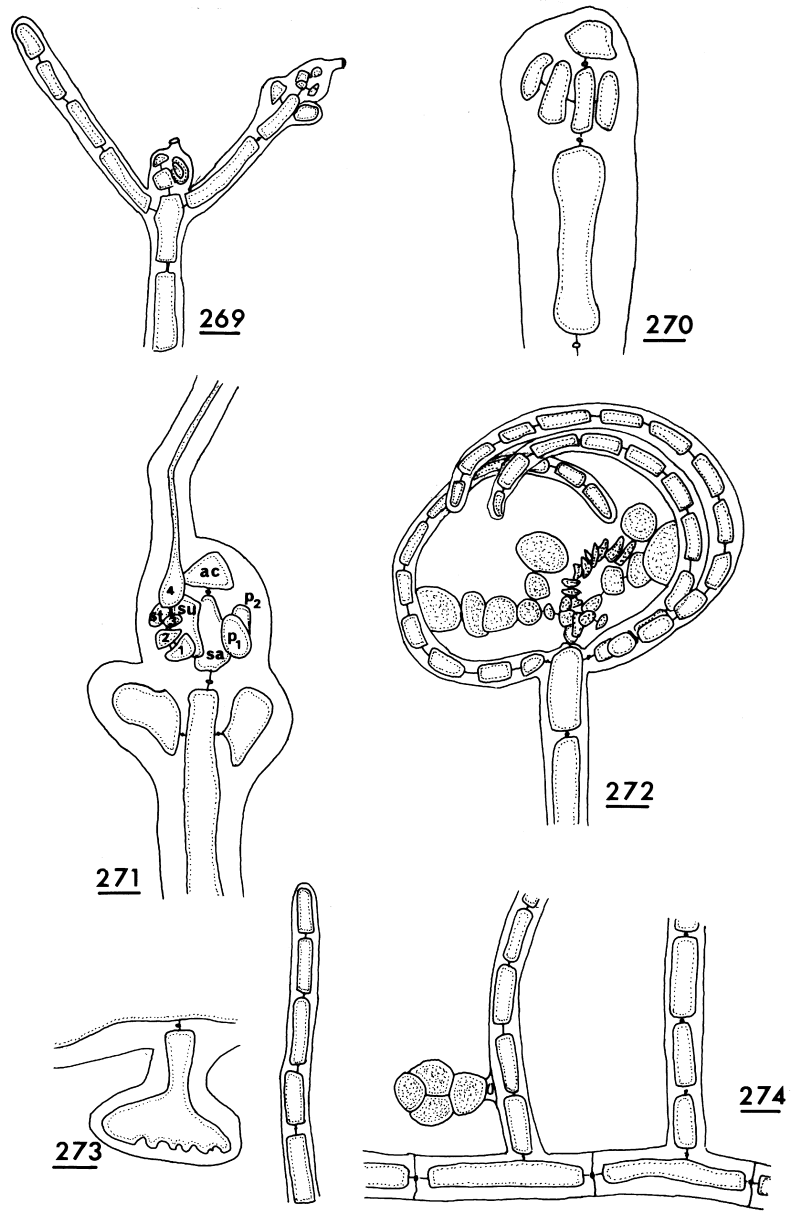


Fig. 269. *Ptilothamnion schmitzii*. Early post-fertilisation stage (SUVA (USP) S13: 9). Scale bar = 20 µm. **Fig. 270.** *Ptilothamnion schmitzii*. Apex of erect branch (SUVA (USP) S13: 9). Scale bar = 10 µm. **Fig. 271.** *Ptilothamnion schmitzii*. Four-celled carpogonial branch system and associated cells (SUVA (USP) S13: 9). See text for explanation. ac = apical cell; hy = hypogenous cell; iv_n = lateral involucral branchlet initials; p_n = pericentral cells; sa = subapical cell; st = sterile terminal cell of supporting cell; su = supporting cell; tg = trichogyne. Scale bar = 10 µm. **Fig. 272.** *Ptilothamnion schmitzii*. Young carposporophyte with well developed involucral branchlets and developing carposporangia (SUVA (USP) S13: 9). Scale bar = 10 µm. **Fig. 273.** *Ptilothamnion schmitzii*. Digitate attachment haptera on ventral surface of prostrate axis (SUVA (USP) S13: 8). Scale bar = 10 µm. **Fig. 274.** *Ptilothamnion schmitzii*. Shortly pedicellate tetrasporangia lateral on erect axis (SUVA (USP) S13: 8). Scale bar = 20 µm.

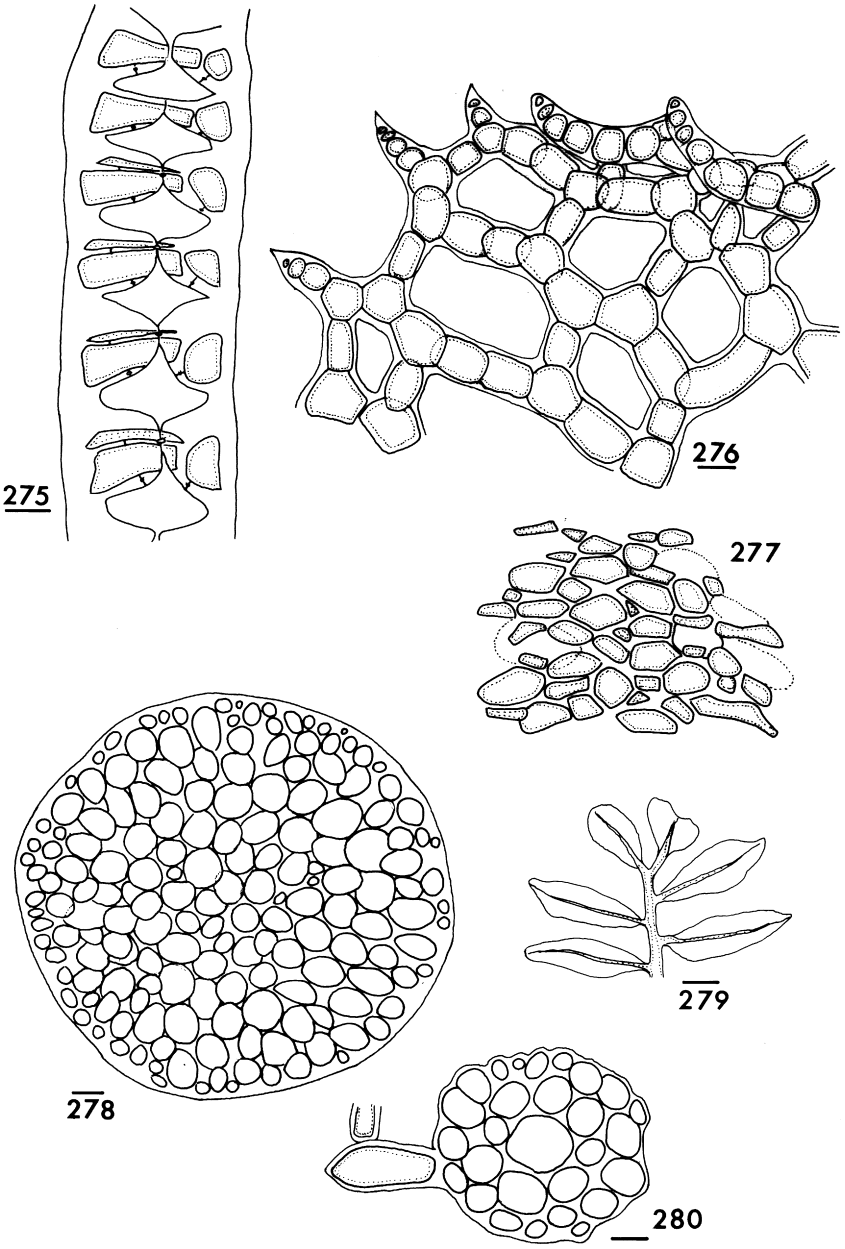


Fig. 275. *Ardreanema seriospora*. Detail of nodal cortication (SUVA (USP) S11: 3). Scale bar = 10 µm. **Fig. 276.** *Thuretia* sp. Detail of monosiphonous network. Scale bar = 50 µm. **Fig. 277.** *Thuretia* sp. Surface cells of main axis. Scale as for 276 = 50 µm. **Fig. 278.** *Thuretia* sp. Cross-section of main axis. Scale bar = 100 µm. **Fig. 279.** *Thuretia* sp. Habit. Scale bar = 5 mm. **Fig. 280.** *Thuretia* sp. Cross-section of ultimate axis. Scale bar = 50 µm.

Taxonomic Synonymy

Includes *Caloglossa vieillardii* Setchell 1924: 161 (non-*Hypoglossum vieillardii* Kützing 1866: 4); includes *Caloglossa leprieurii* f. *pygmaea* auct. non-(von Martens) *post sensu* Dawson 1956: 57, fig. 59 and Womersley and Bailey 1970: 327; see Wynne and Kraft 1985.

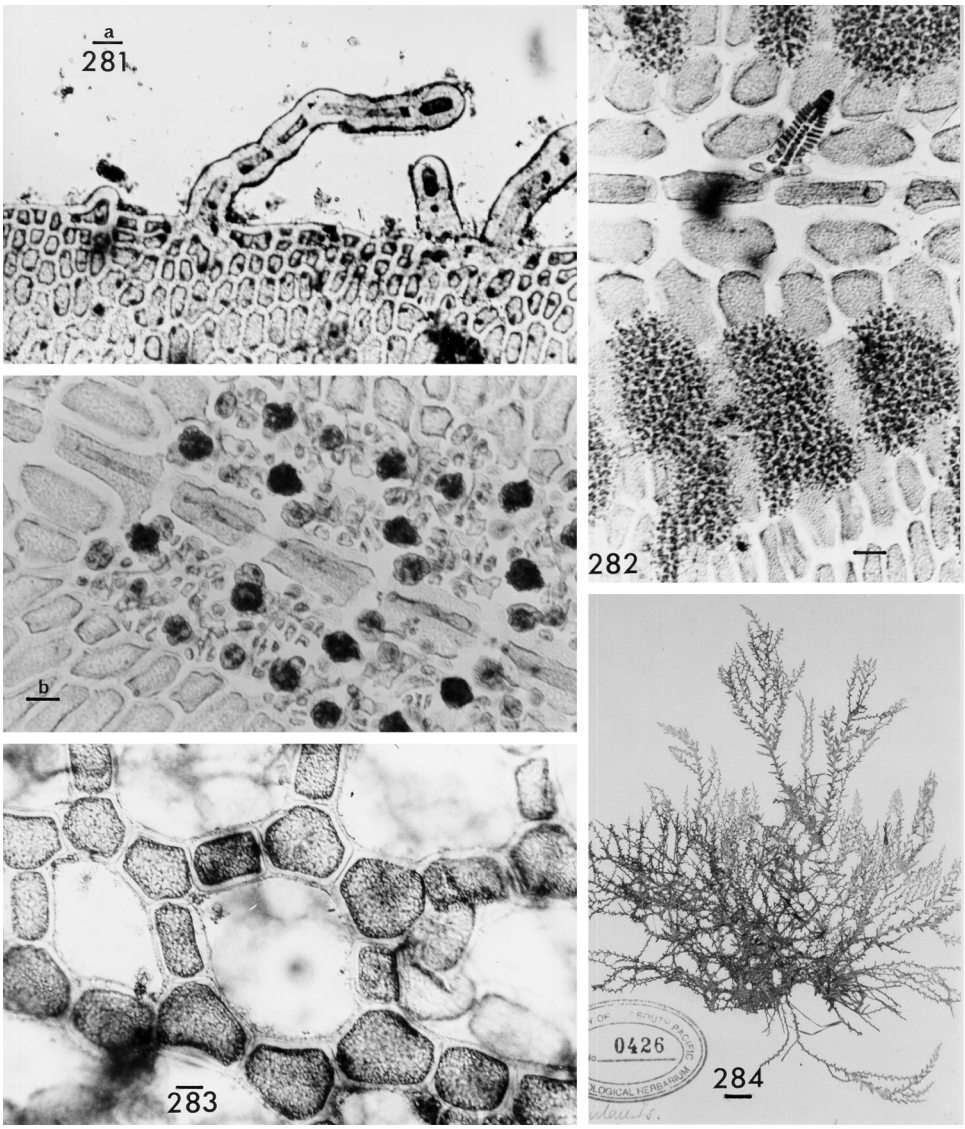


Fig. 281. (*a*) *Hypoglossum simulans*. Multicellular rhizoids issued from blade margin SUVA (USP) S14: 10). Scale bar = 100 µm. (*b*) Tetrasporangial sori. Scale bar = 40 µm. **Fig. 282.** *Hypoglossum simulans*. Spermatangial sori on either side of midrib. Note young lateral branchlet arising endogenously from axial cell (SUVA (USP) S14: 10). Scale bar = 70 µm. **Fig. 283.** *Thuretia* sp. Detail of cells of network. Scale bar = 20 µm. **Fig. 284.** *Acanthophora spicifera*. Habit (SUVA (USP) 426). Scale bar = 8 mm.

Fiji and Rotuma Records

N'Yeurt 1996: 426, figs 176, 178, 180, 184; N'Yeurt *et al.* 1996*b*: 84.

Representative Material Examined

Fish Patch (*Keats*, 12.v.1994: SUVA (USP) S9: 17, 23.viii.1994: SUVA (USP) S11: 19).

Thallus small, delicate and creeping, up to 10 × 0.6 mm, with regular patterns of constrictions (nodes and internodes) which are potential points of attachment of thallus to the substratum via elaborate holdfasts composed of numerous multicellular rhizoids terminating in subpeltate knobs. Blades ovoid-elongate, indeterminate and percurrent, with nodal endogenous branching from the thallus midrib. A transversely dividing apical cell 7–8 × 9–10 µm terminates each axis or blade, with all third–order initials reaching the thallus margin and all cells of the second-order cell row bear third-order rows. Blade wings monostromatic, with a tristromatic median line composed of an elongate axial cell 57–71 × 13–18 µm and a pair of transverse pericentral cells 57–64 × 11–20 µm on either side. About 8–10 squarish to rectangular marginal cells 3–4 µm in diameter are derived from each axial cell. Plants sterile.

Habitat and Remarks

Epiphytic on crustose coralline algae, at 10–15-m depth.

Hypoglossum geminatum Okamura 1908: 156, pl. 32, figs 7–12 (lectotype locality: Misaki, Kanagawa Prefecture, Japan); Yoshida and Mikami 1986: 183, figs 15–27; Millar 1999; Millar *et al.* 1999 (Figs 289–292)

Fiji and Rotuma records

N'Yeurt 1997: 296.

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 27.xi.1994: SUVA (USP) 1160, S14: 7).

Thallus erect and decumbent from a subdichotomously divided, compressed disc-like basal holdfast about 1 mm wide, giving rise to a series of large, lanceolate, apically and basally attenuated blades up to 16 × 3.5 mm. Lateral branchlets arising strictly in pairs from the midrib; blade apices broad and subacute, not distinctly tapered. Midrib heavily corticated in basal portions of thallus. Apical cell 14–16 × 8–9 µm, transversely divided. Axial cells 171–178 × 50–57 µm, giving rise on each side to a pair of periaxial cells 143–178 × 57–114 µm. Each periaxial cell gives rise to second-order rows, with most third-order initials further dividing to form fourth-, fifth- and up to eighth-order rows. Occasionally, some second- or third-order rows reach up to the thallus margin, or third-order initials are produced by cells close to the margin. Marginal cells squarish to elongate and rather small, 7–10 µm in diameter. Cystocarps subspherical to urceolate, 550–630 µm in diameter, ostiolate and sessile on the midrib. Tetrasporangia and spermatia not seen.

Habitat and Remarks

Growing on silty coralline substratum, at 15–20-m depth at Belcher Rocks.

This distinctive species agrees well with the original description by Okamura (1908). In addition to its peculiar divided and disc-like compressed 'holdfast', its large size and strictly paired, endogenous branching make it easily recognisable in the field. It mainly differs from the erect species *Hypoglossum subsimplex* (Wynne 1994) and *H. minimum* (Yamada 1936) by its much larger size, subacute branch apices and paired branching. Its large size, paired branching and division of second order periaxial initials up to the eighth order and lack of regular organisation of cells close to the midrib, separate the Fijian species from *H. simulans*.

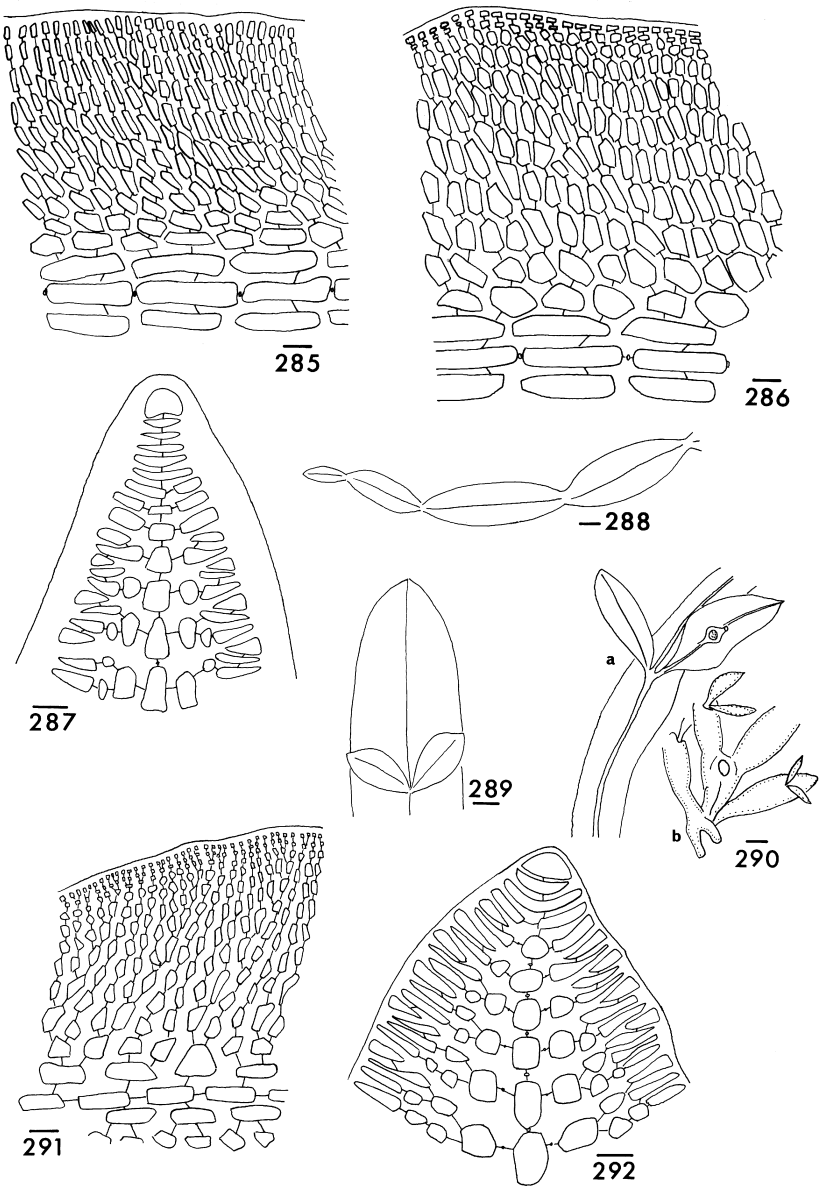


Fig. 285. *Hypoglossum caloglossoides*. Blade showing all third-order initials reaching thallus margin (SUVA (USP) S9: 17). Scale bar = 20 µm. **Fig. 286.** *Hypoglossum simulans*. Blade showing first few cells issued from periaxial cells in distinct longitudinal rows. Note marginal cells which are broader than long (SUVA (USP) S14: 10). Scale bar = 100 µm. **Fig. 287.** *Hypoglossum caloglossoides*. Blade apex (SUVA (USP) S9: 17). Scale bar = 10 µm. **Fig. 288.** *Hypoglossum caloglossoides*. Habit, showing regularly constricted catenate thallus (SUVA (USP) S9: 17). Scale bar = 200 µm. **Fig. 289.** *Hypoglossum geminatum*. Habit, showing paired endogenous branching (SUVA (USP) S14: 7). Scale bar = 600 µm. **Fig. 290.** (*a*) *Hypoglossum geminatum*. Habit, showing urceolate cystocarp issued from distinct midrib (SUVA (USP) S14: 7). Scale bar = 800 µm. (*b*) Subdichotomously divided compressed holdfast. Scale bar = 800 µm. **Fig. 291.** *Hypoglossum geminatum*. Blade, showing squarish marginal cells (SUVA (USP) S14: 7). Scale bar = 100 µm. **Fig. 292.** *Hypoglossum geminatum*. Blade apex (SUVA (USP) S14: 7). Scale bar = 10 µm.

Hypoglossum simulans Wynne, I.Price et Ballantine 1989: 31, 32, figs 12–26 (type locality: Ilet de Pigeon, Malendure, west side of Basse-Terre, Guadeloupe, West Indies); Wynne 1989: 515, figs 1*H*, 2*A–E* (Figs 281*a, b*, 282, 286)

Fiji and Rotuma Records

N'Yeurt 1997: 297.

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 27.xi. 1994: SUVA (USP) S14: 10, *tetrasporic and spermatangial*); Moorea I., French Polynesia (*N'Yeurt*, 12.xii.1995: SUVA (USP) S14: 11).

Thallus spreading and decumbent, with narrow lanceolate blades up to 15 × 1.6 mm, attached to the substratum and other thalli by uni- or multicellular rhizoids issued from blade margins and apices. Lateral branches mostly adaxial, arising singly and endogenously from the midrib; branchlets usually arising from the basal segment of the parent blade. Apices rounded to acute, with an apical cell 7–8 µm in diameter and transversely dividing. Mature axial cells 328–350 × 65–70 µm, flanked on each side by a pair of periaxial cells 292–314 × 71–78 µm cutting off second-order cell rows, of which only the innermost cells bear third-order rows which all reach the thallus margin. The first 4 rows of cells from the periaxial cells are subrectangular to polygonal, 92–142 × 50–71 µm, usually arranged in distinct longitudinal rows. Marginal cells small and subrectangular, 28–35 × 14–21 µm, parallel to blade axis. Spermatia 2–3 µm in diameter, in discrete sori on both sides of blade of male thallus; young tetrasporangia tetrahedrally divided, 26–34 µm in diameter, loosely scattered in elongate sori around the midrib. Cystocarps not seen.

Habitat and Remarks

Growing in entangled clumps and on bryozoans, at 15–20-m depth. Originally described from the Indian Ocean, this distinctive species has since been identified to occur through the Pacific and is likely to be widely distributed.

Genus ***Myriogramme*** Kylin 1924
Myriogramme sp. (Fig. 320)

Fiji and Rotuma Records

South *et al.* 1993: 191, figs 9, 10; N'Yeurt *et al.* 1996*b*: 84.

Representative Material Examined

Fish Patch (*Keats*, 12.v.1994: SUVA (USP) S9:16); Makaluva I. (*Keats*, 19.vi.1994: SUVA (USP) S10: 12; 5.viii.1994: SUVA (USP) S11: 6).

Thallus a monostromatic blade 5–10 mm wide, irregularly branched and attached to the subtratum via marginal multicellular holdfasts terminating in multicellular rhizoids. Colour deep pink; cells in surface view angular to subrectangular, 28–35 µm in diameter. Material sterile.

Habitat and Remarks

Epiphytic on other algae and coral debris, at 10–30-m depth. The lack of fertile material precludes a definite identification of the Suva material, although it is vegetatively close to *Myriogramme carnea* (Rodriguez) Kylin, also found in French Polynesia in similar habitats (Payri and N'Yeurt 1997).

Genus ***Neomartensia*** Yoshida et Mikami 1996: 106
Neomartensia flabelliformis (Harvey ex. J.Agardh) Yoshida et Mikami 1996: 106; figs 25–36; Abbott 1999*a*: 346, fig. 100*A–D*; Millar *et al.* 1999: 570, fig. 5*E* (Fig. 322)

Basionym and Nomenclatural Synonymy

Martensia flabelliformis Harvey ex. J.Agardh 1863: 826, 827 (type locality: Tonga).

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 84 (as *Martensia elegans* Hering).

Representative Material Examined

Namara I., Great Astrolabe Reef (*Carlson*, 10.xii.1972: SUVA (USP) 313); Suva Barrier Reef (*Keats*, 24.ix.1994: SUVA (USP) 1137).

Thallus flabellate, 3–5 cm in diameter, composed of a short stipe 1–2 mm high and a fan-shaped proximal membranous portion 4–5 mm in diameter and a distal network area organised into an open meshwork. The proximal membranous portion is composed of 7 or 8 layers of irregularly arranged flat cells that become outwardly smaller in size. Specimens sterile.

Habitat and Remarks

Grows at about 10-m depth, on the outer reef wall. The Fijian plants fit well with the description of *Neomartensia flabelliformis* and were kindly examined and ascertained as such by Professor T. Yoshida (pers. comm.).

Family **Rhodomelaceae** Areschoug 1847: 260, *nomen conservandum*
Tribe **Chondrieae** Schmitz and Falkenberg 1897: 432
Genus ***Acanthophora*** Lamouroux 1813

Acanthophora pacifica (Setchell) G.T.Kraft 1979: 128, figs 1–6, 18–24; Abbott 1999*a*: 353, fig. 102*A–C* (Figs 293–299, after M. J. Wynne)

Basionym

Cladhymenia pacifica Setchell 1926: 102, pl. 22, figs 3, 4 (type locality: Arue Point, Tahiti).

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 85.

Representative Material Examined

Suva Barrier Reef (*Kasahara*, 3.x.1985: SUVA (USP) 876; 15.x.1985: SUVA (USP): 875); Fish Patch (*Keats*, 23.viii.1994: SUVA (USP) 790); Belcher Rocks (*Keats*, 2.xi. 1994; 30.xi.1994: *in Herb.* USP, liquid-preserved).

Thalli rosy-pink to light pinkish-yellow, consisting of gregarious entangled clumps of flattened ligulate axes, 2–4 × 30–50 mm. Primary holdfast large and discoid (up to 5 mm in diameter), giving rise to one or more terete erect stipes flattening out into primary axes or blades. Branching to 4 or 5 orders, without midribs. The margins of the flattened axes are conspicuously dentate to spinose, these processes sometimes arising from the blade surface. The tips of major axes are often drawn out into elongate, arcuate cylindrical axes 0.5–1.5 cm long, becoming attached to the substratum or other axes. The tip of lateral branches or blades can also act as attachment organs, leading in the entangled habit of the plants.

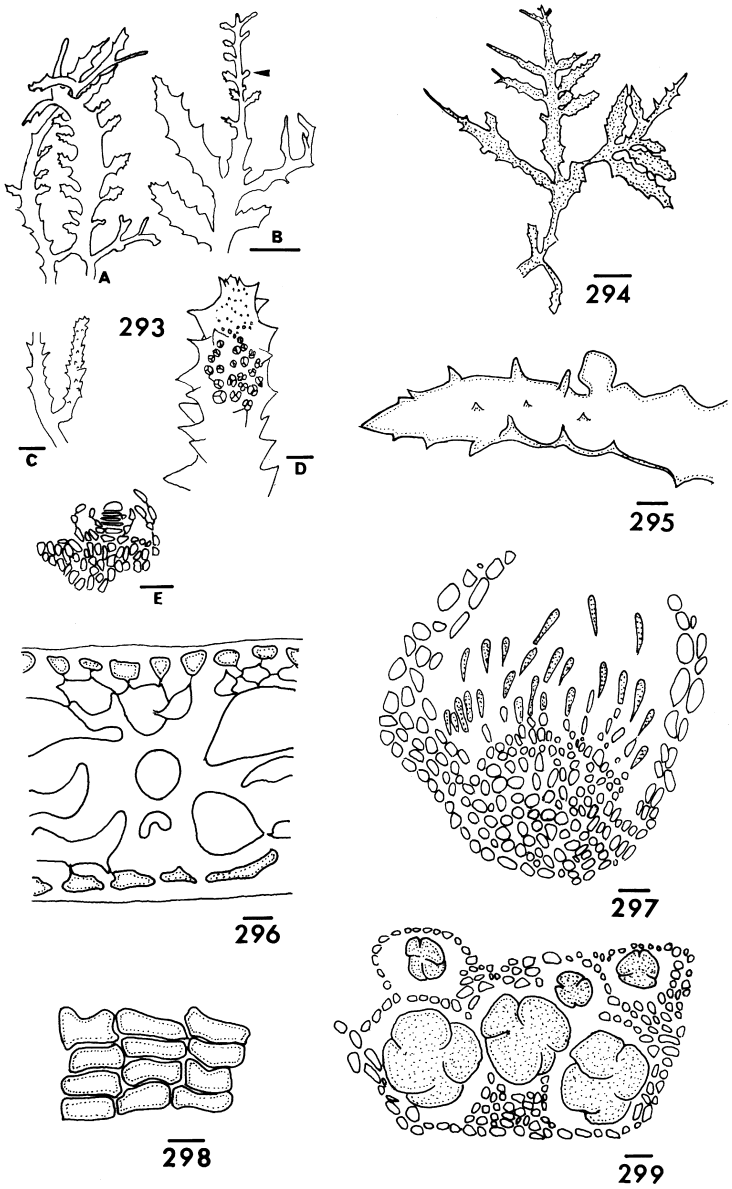


Fig. 293. (*a, b*) *Acanthophora pacifica* (SUVA (USP) 790). Habit, showing foliose sterile branches and terete tetrasporangiate branches (arrowhead). Scale bar = 5 mm. (*c*) Tetrasporangiate branch. Scale bar = 1 mm. (*d*) Detail of tetrasporangia on tetrasporangiate branch. Scale bar = 250 µm. (*e*) Apex of vegetative axis, showing exerted apical cell surrounded by spirally arranged trichoblasts. Scale bar = 20 µm. **Fig. 294.** *Acanthophora pacifica*. Habit (SUVA (USP) 876). Scale bar = 5 mm. **Fig. 295.** *Acanthophora pacifica*. Blade with urceolate marginal cystocarp (SUVA (USP) 790). Scale bar = 1 mm. **Fig. 296.** *Acanthophora pacifica*. Cross-section of thallus (SUVA (USP) 790). Scale bar = 20 µm. **Fig. 297.** *Acanthophora pacifica*. Cross-section of cystocarp, showing pyriform carposporangia (SUVA (USP) 790). Scale bar = 50 µm. **Fig. 298.** *Acanthophora pacifica*. Surface cells of blade (SUVA (USP) 790). Scale bar = 50 µm. **Fig. 299.** *Acanthophora pacifica*. Detail of tetrasporangia (SUVA (USP) 790). Scale bar = 50 µm.

Apices of axes terminate in a single, transversely dividing apical cell about 13 µm in diameter that projects slightly above the adjacent blade. Weakly developed trichoblasts are associated with the apex, being cut off in a spiral arrangement from the segments immediately proximal to the apical cell. This spiral arrangement is detectable by the presence of pits from which the trichoblasts emerge.

In cross-section, the primary axial row 84–105 µm in diameter is surrounded by 5 pericentral cells 52–63 µm in diameter and a mixture of medullary and subcortical cells, with a single cortical layer of subrectangular to cuneate cells 11–20 × 31–42 µm. The walls of most inner cells except the cortical cells are thickened with refractive material, in an uneven or regular fashion.

Tetrasporangia tetrahedrally divided, 90–180 µm in diameter when mature, borne in terete, densely and randomly spinulose stichidia arising from the margins of parent blades. Young procarps are located on the adaxial side of spines arising from the blade surface. Mature cystocarps ovoid to urceolate, 1–1.2 mm in diameter, shortly pedicellate, with an ostiolate pericarp surrounding the central cystocarp. Carposporangia 12–16 × 50–90 µm. Spermatangia not seen; assumed to occur in platelets borne spirally on trichoblasts near the apices as for the genus.

Habitat and Remarks

Growing at 10-m depth, on coral substratum. Recent collections from Tahiti and Moorea Islands in French Polynesia yielded specimens identical to the Fijian material, confirming that this species is likely to be widespread in the tropical Pacific (Payri *et al.* 2000).

Acanthophora spicifera (Vahl) Børgesen 1910: 201, figs 18*A–C*; 19*A–E*; Dawson 1954: 456, fig. 61*a*, *b*; Abbott 1999*a*: 355, fig. 102*D, E* (Fig. 284)

Basionym and Nomenclatural Synonymy

Fucus spicifer Vahl 1802: 44 (‘*spicifera*’) (type locality: St Croix, Virgin Is).

Fiji and Rotuma Records

Grunow (1874: 47); Chapman 1971: 170; fig. 5 (both as *Acanthophora orientalis*); South and Kasahara 1992: 65; South 1993: 345, fig. 15; N’Yeurt *et al.* 1996*b*: 85.

Representative Material Examined

Nukulau I. (*South*, 19.xii.1990: SUVA (USP) 426, 652); Makaluva I. (*South*, 9.ix.1991: SUVA (USP) 277); Suva Point (*South*, 7.vii.1990: SUVA (USP) 453; 18.xi.1990: SUVA (USP) 643); Veiuto (*anon*, 20.v.1966: BISH 525934).

Thallus erect, 8–13 cm high, branching alternate. Main axis 0.8–1 mm in diameter, lateral branchlets 300–500 µm in diameter, dentate. Outer cortex consisting of longitudinally aligned cells 4 or 5 times longer than wide. Apices pyramidal, surrounded by a cluster of incurving forked trichoblasts. Structure uniaxial, with 5 pericentral cells around the axial cell. Cross-section not always uniformly cellular around main axis, sometimes with large isodiametric cells interspersed with smaller or filamentous cells.

Habitat and Remarks

Grows intertidally on the reef flat. This alga is edible and eaten in the traditional Fijian diet (South 1993, p. 345).

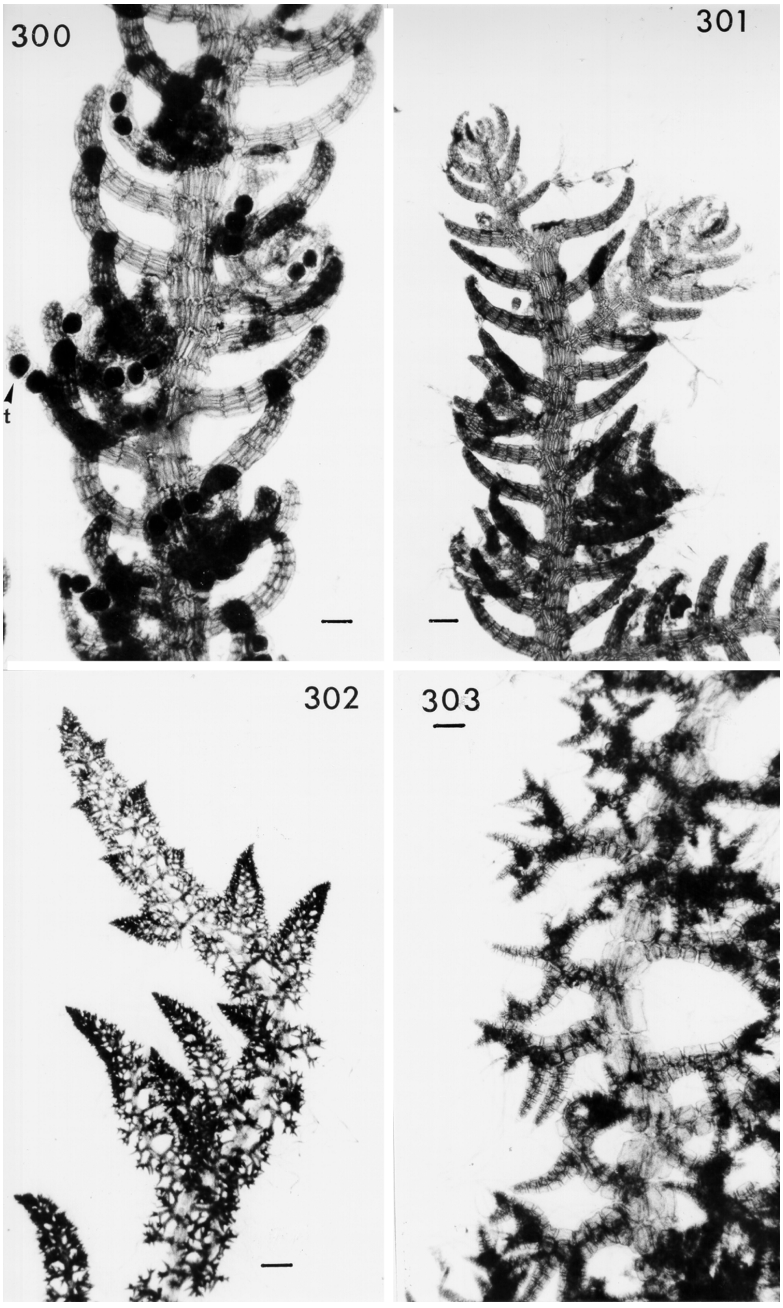


Fig. 300. *Herposiphonia subdisticha*. Habit, showing tetrasporangia (arrowhead) occurring singly and in series in branch segments (SUVA (USP) S12: 1). Scale bar = 150 µm. **Fig. 301.** *Herposiphonia subdisticha*. Habit, showing determinate laterals with terminal tufts of trichoblasts (SUVA (USP) S12: 1). Scale bar = 300 µm. **Fig. 302.** *Tolypiocladia glomerulata*. Habit, showing spirally arranged laterals about indeterminate polysiphonous axis (SUVA (USP) S1: 1). Scale bar = 1 mm. **Fig. 303.** *Tolypiocladia glomerulata*. Habit, showing detail of repeatedly divaricately branched, corymbose laterals with terminal hyaline trichoblasts (SUVA (USP) S1: 1). Scale bar = 150 µm.

Tribe **Polysiphonieae** Schmitz 1889: 447
Genus ***Polysiphonia*** Greville 1824: 308

Several species of *Polysiphonia* are reported from Fiji (N'Yeurt *et al.* 1996) and there is a need to critically examine these records. The following common species was found to occur in the Suva area.

Polysiphonia scopulorum Harvey 1855: 540 (type locality: Rottnest I., WA, Australia); Millar 1990: 445, figs 65*E–G*; Price and Scott 1992: 210, fig. 77*A–D*; Abbott 1999*a*: 425, fig. 125*C–F*
var. ***scopulorum*** (Harvey) Hollenberg 1968: 79, fig. 6*F* (Figs 304, 308)

Fiji and Rotuma Records

Kapraun and Bowden 1978: 201, figs 23, 24 ('*scopularum*'); South 1992: 9; South and Kasahara 1992: 67; N'Yeurt 1996: 433, figs 207*a–d*; N'Yeurt *et al.* 1996*b*: 87.

Representative Material Examined

Belcher Rocks (*Keats*, 27.xi.1994: SUVA (USP) S15: 4, *cystocarpic*).

Thallus epiphytic and erect, purplish-red, up to 10 mm high, with rigid axes 54–272 µm in diameter. Structure uniaxial, with 4 pericentral cells each about 29 × 58–100 × 164 µm around a central axial cell about 76 × 12 µm. The segments of the axes are mostly longer than broad; the apical region of the bearing trichoblasts at intervals of 2 or 3 segments from the tip, with scar cells present on lower parts. Trichoblasts up to 50 × 9 µm. Cystocarps 360–365 µm in diameter, globose and shortly pedicellate, with pyriform carposporangia 35–36 µm in diameter.

Habitat and Remarks

Epiphytic on coralline algae, at 20-m depth. As outlined by Abbott (1999), *P. scopulorum* has a variety of growth forms, which are probably ecomorphs of the same species.

Tolypiocladia glomerulata (C.Agardh) Schmitz in Schmitz and Falkenberg 1897: 441, 442; Falkenberg 1901: 177, 178, pl. 21, figs 27–29; Dawson 1954: 452, fig. 59*b–c*; Price and Scott 1992: 219, fig. 81*A–D*; Wynne 1995: 321, fig. 80; Abbott 1999*a*: 442, fig. 132*F–H* (Figs 302, 303)

Basionym and Nomenclatural Synonymy

Hutchinsia glomerulata C.Agardh 1824: 158 (type locality: Shark Bay, WA, Australia).

Fiji and Rotuma Records

Garbary *et al.* 1991: 256; South 1991: 9; N'Yeurt *et al.* 1996*b*: 88.

Representative Material Examined

Makaluva I. (*South*, 19.xii.1990: SUVA (USP) S1: 1); Nukulau I. (*South*, 19.xii.1990: SUVA (USP) 602, S8: 3).

Thallus reddish to dark brown, 1–2 cm high, erect, flaccid and tufted with occasional to frequent lateral or irregular branching; attached to the substratum via unicellular rhizoids issued from indeterminate prostrate axes. Branches 250–550 µm in diameter, terete and spongy, with central indeterminate polysiphonous axes bearing numerous short, polysiphonous and spirally arranged laterals 0.8–1.3 mm × 150–300 µm, which are

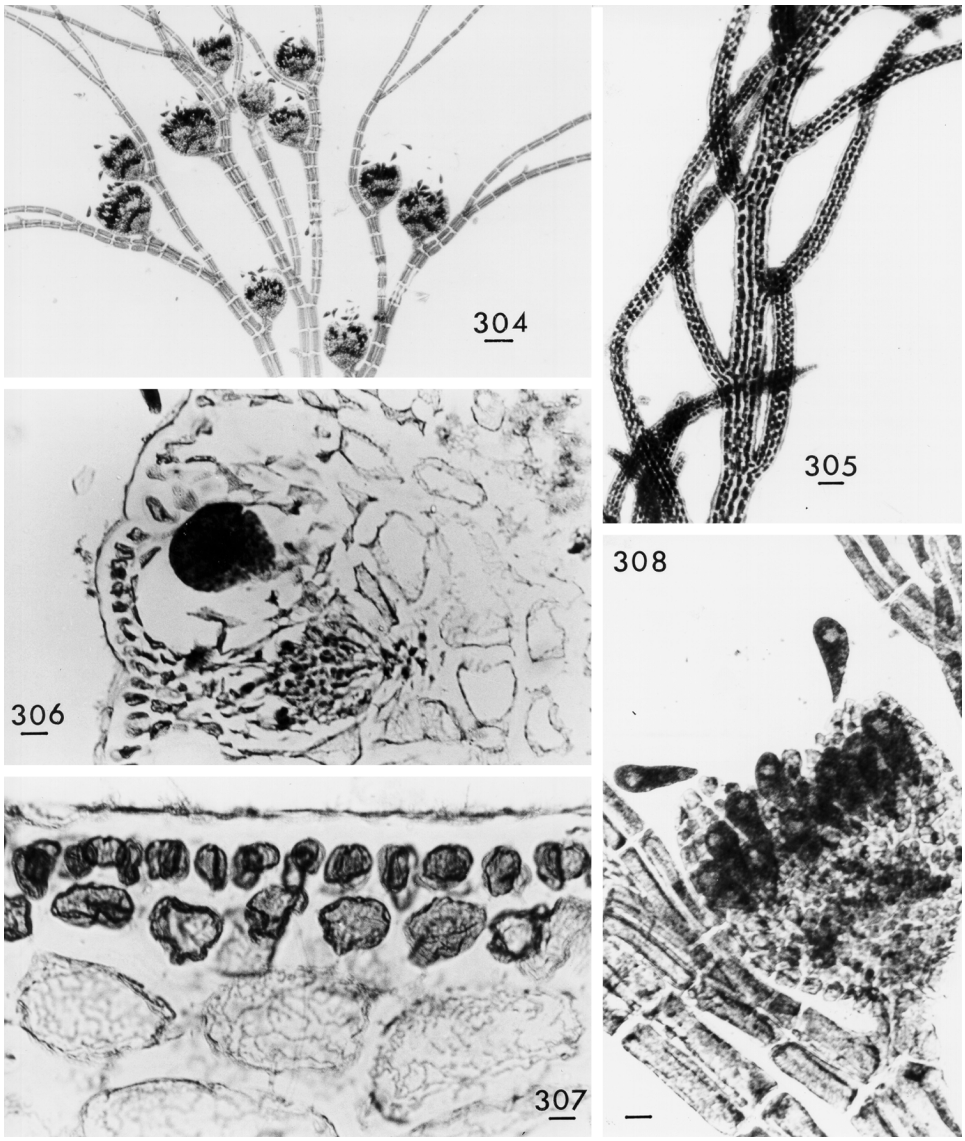


Fig. 304. *Polysiphonia scopulorum*. Habit of cystocarpic thallus (SUVA (USP) S15: 4). Scale bar = 300 µm. **Fig. 305.** *Bostrychia radicans*. Habit, showing ecorticate, alternately branched main axis (SUVA (USP) S2: 2). Scale bar = 300 µm. **Fig. 306.** *Laurencia glandulifera*. Tetrasporangial stichidia (SUVA (USP) 307). Scale bar = 25 µm. **Fig. 307.** *Laurencia glandulifera*. Longitudinal section of thallus (SUVA (USP) 307). Scale bar = 10 µm. **Fig. 308.** *Polysiphonia scopulorum*. Detail of mature cystocarp with pyriform carposporangia (SUVA (USP) S15: 4). Scale bar = 25 µm.

repeatedly divaricately branched and corymbose with acute apices. Trichoblasts 15–30 µm × 1.5–1.8 mm, hyaline, monosiphonous and simple, borne laterally and subterminally on ultimate branchlets. Structure uniaxial and radial; ecorticate. Axial cell with four pericentral cells; a single polysiphonous lateral arising from each segment of indeterminate axes. Reproduction not seen.

Habitat and Remarks

Forming small spongy clumps on the reef flat.

Tribe **Herposiphonieae** Schmitz et Falkenberg 1897: 457
Genus ***Herposiphonia*** Nägeli 1846: 238

Herposiphonia subdisticha Okamura 1899: 37, pl. I, figs 12–14 (syntype localities: Enoshima, Kanagawa Prefecture and 'Boshu' (Chiba Prefecture), Japan) (Figs 300, 301)

Fiji and Rotuma Records

Garbary *et al.* 1991: 255; N'Yeurt *et al.* 1996*b*: 85.

Representative Material Examined

Suva Reef (*Keats*, 21.ix.1994: SUVA (USP) S12: 1).

Thallus dark reddish-brown, up to 10 mm long. Habit mostly prostrate, with alternate to subdistichous and complanate branching in a regular pattern of three determinate laterals inserted between successive indeterminate laterals. Determinate laterals subterete, up to 1 mm × 150 µm, with blunt upward-curving apices beset with a tuft of trichoblasts up to 500 µm long. Structure uniaxial, with 7 or 8 elongate pericentral cells around axial cell. Cortication not present. Tetrasporangia 50–100 µm in diameter, tetrahedrally divided, occurring 1 per segment in straight series in determinate laterals. Carposporangia and spermatangia not seen.

Habitat and Remarks

Epiphytic on macroalgae, subtidally up to 20-m depth. The Fijian material has conspicuous apical trichoblasts terminal on determinate branchlets, a feature characteristic of *H. subdisticha* (Millar 1990, p. 451) but not reported by Dawson (1963). The apices of the Fijian plants are also more blunt than Dawson's Pacific Mexico material, which also differs in having mostly distichous branching as opposed to alternate or subdistichous branching in the Suva material. However, the Japanese material of the species as described by Okamura (1899, p. 1915) seems in good agreement with the Fijian plants.

Subfamily **Bostrychioideae** Hommersand 1963: 332
Tribe **Bostrychieae** Falkenberg 1901: 504
Genus ***Bostrychia*** Montagne 1842*b*: 39, *nomen conservandum*

Key to the Suva Lagoon and Reef Species of *Bostrychia*

1. Main indeterminate axis ecorticate ..... *B. radicans*
   Main indeterminate axis corticated ..... *B. tenella*

Bostrychia radicans (Montagne) Montagne 1842*c*: 661; Falkenberg 1901: 513, pl. 12, fig. 4; Dawson 1963*b*: 419, pl. 136, fig. 3; King and Puttock 1989: 25–28, figs 10*b*, 10*d*, 11*b*, 12 (Fig. 305)

Basionym and Nomenclatural Synonymy

Rhodomela radicans Montagne 1840: 198, pl. 5, fig. 3 (type locality: near Cayenne, French Guiana).

Fiji and Rotuma Records

Post 1967; Chapman (1971: 170); N'Yeurt *et al.* 1996*b*: 85.

Representative Material Examined

Laucala Bay (*South*, 8.vii.1990: SUVA (USP) 454, S2: 4); Suva Point (*South*, 24.iii.1993: SUVA (USP) S2: 2).

Thallus robust, prostrate with suberect branches, completely ecorticate and polysiphonous. Indeterminate main axis 500–600 µm in diameter, alternately branched, bearing determinate lateral branchlets. Structure uniaxial, with 2 tiers of pericentral cells per axial cell; 5–8 pericentral cells per tier. Material sterile.

Habitat and Remarks

Growing on rocks, near the low-water mark.

Bostrychia tenella (Lamouroux) J.Agardh 1863 (1851–1863): 869; Falkenberg 1901: 515, pl. 12, figs 10–13; King and Puttock 1989: 34

Basionym and Nomenclatural Synonymy

Fucus tenellus Vahl 1802: 45, *nom. illeg*. (type locality: St Croix, Virgin Is).

Fiji and Rotuma Records

Kapraun and Bowden 1978: 201; South and Kasahara 1992: 65; N'Yeurt 1996: 429, figs 129, 186; N'Yeurt *et al.* 1996*b*: 85.

Representative Material Examined

Laucala Bay (*Kasahara*, 9.ix.1985: SUVA (USP) 726, 727, 728).

Plants 5–20 mm high, found as rather soft, dense moss-like clumps; 3 times pinnately branched with dense bilateral branching near the typically incurved tips. Aggregates almost black, individual plants dark red to purple, main axis corticated, 105–170 µm in diameter, 2 tiers of pericentral cells per axial cell, with 6–8 pericentral cells each. Secondary branchlets 35–60 µm in diameter, at 170–200-µm intervals along main axis; polysiphonous, corticated below and uncorticated above. Ultimate branchlets monosiphonous 12–24 µm in diameter, 10–20 cells long with individual cells 8–10 µm long.

Habitat and Remarks

Found as dense, almost black clumps on rocks and walls near the high-tide mark, in the breakwater area.

Genus ***Amansia*** Lamouroux 1809: 332
Amansia rhodantha (Harvey) J.Agardh 1841: 26; R. E. Norris 1988: 211, figs 1–11 (as *Amansia glomerata* C.Agardh); Masuda *et al.* 2000: 188, figs 37–42; Payri *et al.* 2000 (Fig. 334*a–b*)

Basionym and Nomenclatural Synonymy

Delesseria rhodantha Harvey 1834: 151, 152, pl. CXXVI (type locality: Cap Malheureux, Mauritius; holotype in TCD, Dublin).
Rytiphlaea rhodantha (Harvey) Decaisne 1842: 358.

Taxonomic Synonymy

Amansia paloloensis South et Skelton 1999: 247, figs 2–14 (type locality: Palolo Deep Marine Reserve, Apia, Samoa).

Misapplied Names

Amansia glomerata C.Agardh 1824: 194; Falkenberg 1901: 416, pl. 1, figs 19–21, pl. 6, figs 14–29.
Melanamansia glomerata (C.Agardh) R.E.Norris 1995: 67; N'Yeurt 1996: 428, figs 127, 128, 185, 197, 198; ?Millar *et al.* 1999: 573, fig. 6*E*.

Fiji and Rotuma Records

Askenasy 1888; Chapman 1971: 170; Kasahara 1985: 67; South 1991: 9; South and Kasahara 1992: 65 (all as *Amansia glomerata* C.Agardh); N'Yeurt 1996: 428, figs 127, 128, 185, 197, 198; N'Yeurt *et al.* 1996*b*: 87 (as *Melanamansia glomerata* (C.Agardh) R.E.Norris).

Representative Material Examined

'Feejee', 1838–1842, leg. Wilkes Exploring Expedition (US 04057a); Nanuyalevu, Yasawa Is, 13.vii.1972, leg. B. Carlson (SUVA (USP) 281); Rukuruku Village, Ovalau, 14.ii.1982, leg. S. Villeneuve (SUVA (USP) 1737); Naukathura I., Yasawa Group, 25.ii.1982, leg. S. Villeneuve (SUVA (USP) 1774); Tangangge, Viti Levu, 3 and 15.x.1985, leg. H. Kasahara (SUVA (USP) 1012, 1069); Vatualailai, Viti Levu, 16.x.1985, leg. H. Kasahara (SUVA (USP) 1013, 1067); Suva Barrier Reef, leg. D. W. Keats, 21.ix.1994 (SUVA (USP) 797); Suva Reef, 3.ii.1995, leg. A. Ballou (SUVA (USP) 5438L); Namada, Viti Levu, 14.iii.1998, leg. P. A. Skelton and G. R. South (SUVA (USP) 2460); Beqa Lagoon, 25.ix.1999, leg. C. Garrigue (SUVA (USP) 5436L).

Plants rose-red, up to 10 cm high (mainly 4–6 cm) and forming characteristic rosettes composed of lanceolate blades up to 35 mm long and 6 mm broad, with inrolled leaf tip and marginal teeth. Central midrib present, becoming narrower and disappearing towards the apex. Central axial cell surrounded by 5 pericentral cells; pseudopericentral cells absent. Stem of plants thick and cartilaginous, 0.5–0.7 mm broad, denuded below. Leaves ecorticate, up to 78 µm thick, composed of 2 layers of elongate cells in V-shaped transverse rows; each cell about 33 × 13 µm in surface view. Marginal teeth up to 1.3 mm × 445 µm, with 3–7 tetrasporangial stichidia in median portions of blade, spaced at about 150-µm intervals. Tetrasporangia up to 80 × 100 µm, formed in pairs in curved stichidia up to 340 × 250 µm terminating endogenous branches (serrations) or developing adventitiously from the marginal teeth. Up to 8 tetrasporangia per stichidium. Spermatangia and cystocarps not seen in Suva collections, but well described for Samoan collections (South and Skelton 1999, p. 249, figs 9–12).

Habitat and Remarks

Found on the outer reef wall and also intertidally on the outer reef flat.

Records of *Amansia glomerata* C.Agardh from South Africa and Mauritius have been ascribed to *A. rhodantha* (Harvey) J.Agardh by Norris (1995, p. 67), based on anatomical and bichemical characters separating it from *Melanamansia*, namely the presence of pseudo-pericentral cells and brown pigments in the latter genus. Rotuman, Tahitian, Samoan and Fijian *Amansia* and *Melanamansia* plants housed in SUVA and UPF were found by the author to represent the same entity, all lacking pseudopericentral cells and thus conforming to pan-tropical *A. rhodantha*. True *Melanamansia* was found to occur in Hawaii, the Philippines and Kenya (N'Yeurt, unpubl. data).

Tribe **Laurencieae** Schmitz 1889: 447
Genus ***Laurencia*** Lamouroux 1813: 42, *sensu lato*

Key to the Suva Lagoon and Reef Species of *Laurencia sensu lato*

1. Thallus compressed, not paniculate 2
   Thallus terete, paniculate . . . . . *L. glandulifera*
2. Outermost cortical cells distinctly projecting; apical pits rounded . . . . . *L. parvipapillata*
   Outermost cortical cells not projecting; apical pits sinuate . . . . . *L. succisa*

Laurencia glandulifera (Kützing) Kützing 1849: 855; Abbott 1999*a*: 386, fig. 112*E, F* (Figs 226, 306, 307, 313, 315, 321)

Basionym and Nomenclatural Synonymy

Chondria glandulifera Kützing 1845: 329 (type locality: Trieste, Italy).

Fiji and Rotuma Records

Chapman 1977: 162 (as *L. botryoides* (Turner) Gaillard); Garbary *et al.* 1991: 255 (as *L. patentiramea*); N'Yeurt *et al.* 1996*b*: 86 (as *L. paniculata*).

Representative Material Examined

Laucala Bay (*Carlson*, 14.i.1973: SUVA (USP) 306, as *L. botryoides*); Nasese (*Seeto*, 24.xii.1991: SUVA (USP) 307).

Thallus dark red and bushy, to 5 cm high, consisting of terete, paniculately branched axes 0.5–1.5 mm in diameter. Branching up to 5 orders; the secondary branchlets percurrent and somewhat pyramidal. Ultimate branchlets short and peg-like, widely separated; most abundant in distal portions of branchlets but also occurring sparsely on all parts of major axes. Plants turning blackish when dry, texture rugose and brittle and not adhering to paper. Structure pseudoparenchymatous, with large clear medullary cells 33–35 × 65–67 µm without lenticular thickenings and an outer cortex consisting of rectangular cells 10–13 × 16–20 µm, arranged in a distinct palisade layer; secondary pit connections absent. Innermost cortical cells 20–30 µm in diameter, with lateral secondary pit connections. Tetrasporangia 75–100 µm in diameter, tetrahedrally divided and embedded in tips of short ultimate branchlets. Spermatia and cystocarps not seen.

Habitat and Remarks

Commonly growing in the lower to upper intertidal, at Laucala Bay and Nasese.

Subgenus ***Chondrophycus*** Tokida et Saito (in Saito 1967)
Laurencia parvipapillata Tseng 1943: 204, pl. IV (type locality: Cape d'Aguilar, Hong Kong); Dawson 1954: 458, fig. 61*g*; 1957: 124; Abbott 1999*a*: 391, fig. 114*A, B* (Figs 309–312, 318)

Fiji and Rotuma Records

Kasahara 1985: 67, pl. 13, fig. 1; South and Kasahara 1992: 66; N'Yeurt *et al.* 1996*b*: 86.

Representative Material Examined

Belcher Rocks, Suva Barrier Reef (*Keats*, 27.xi.1994: SUVA (USP) 889, S15: 5).

Thalli cartilaginous, strongly compressed and pinnately branched, up to 20 × 2.5 mm. Colour purplish-red, not adhering to paper when dry. Cortex 2-layered; outermost cortical cells up to 21 × 57 µm, elongated radially in transverse section and markedly projecting above the surface of the upper portions of branchlets. Innermost cortical cells subspherical,

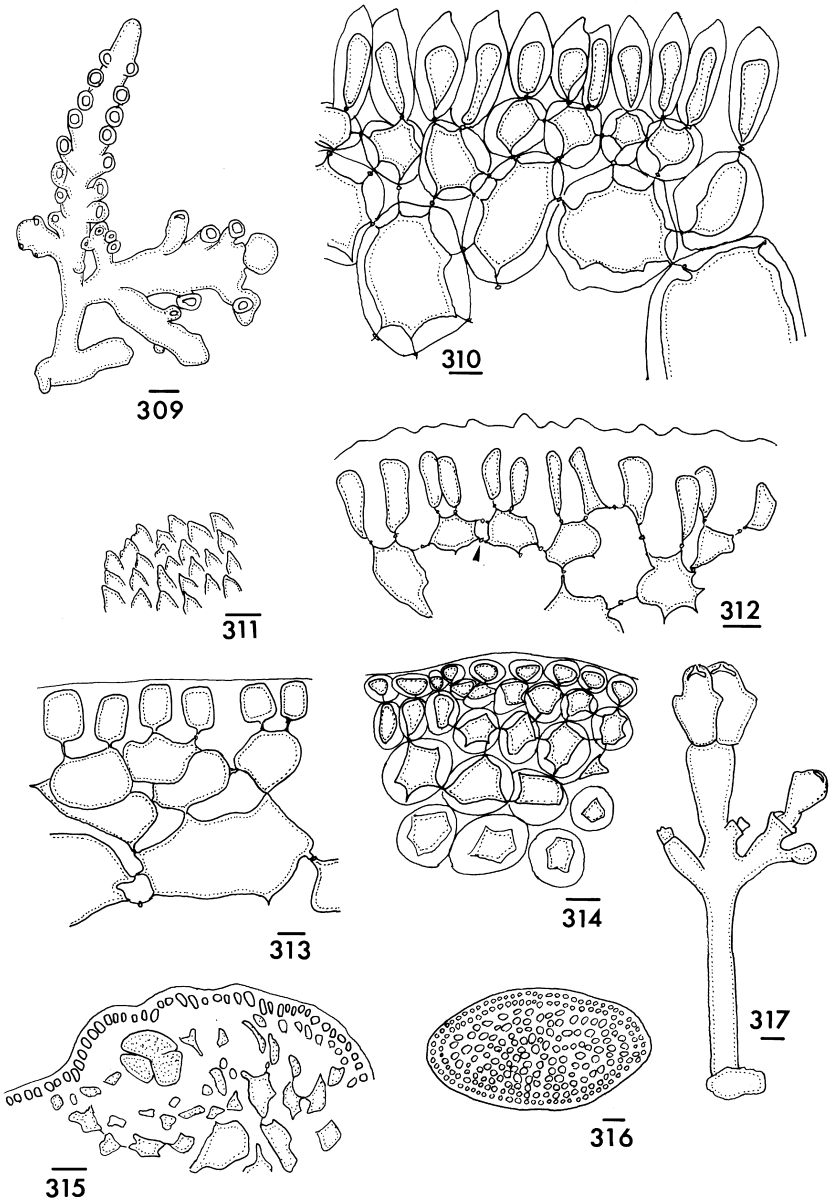


Fig. 309. *Laurencia parvipapillata*. Habit (SUVA (USP) 889). Scale bar = 1 mm. **Fig. 310.** *Laurencia parvipapillata*. Cross-section of thallus showing markedly protruding outermost cortical cells (SUVA (USP) S15: 5). Scale bar = 20 µm. **Fig. 311.** *Laurencia parvipapillata*. Surface view of mamillate exerted cortical cells (SUVA (USP) S15: 5). Scale bar = 20 µm. **Fig. 312.** *Laurencia parvipapillata*. Longitudinal section of thallus, showing secondary pit connections between inner cortical cells (arrowhead) (SUVA (USP) S15: 5). Scale bar = 20 µm. **Fig. 313.** *Laurencia glandulifera*. Cross-section of thallus (SUVA (USP) 307). Scale bar = 20 µm. **Fig. 314.** *Laurencia succisa*. Cross-section of thallus (SUVA (USP) 1163). Scale bar = 100 µm. **Fig. 315.** *Laurencia glandulifera*. Detail of tetrasporangial stichidia (SUVA (USP) 307). Scale bar = 50 µm. **Fig. 316.** *Laurencia succisa*. Cross-section of thallus (SUVA (USP) 1163). Scale bar = 20 µm. **Fig. 317.** *Laurencia succisa*. Habit, showing slit-like grooves on axis tips (SUVA (USP) 1163). Scale bar = 5 mm.

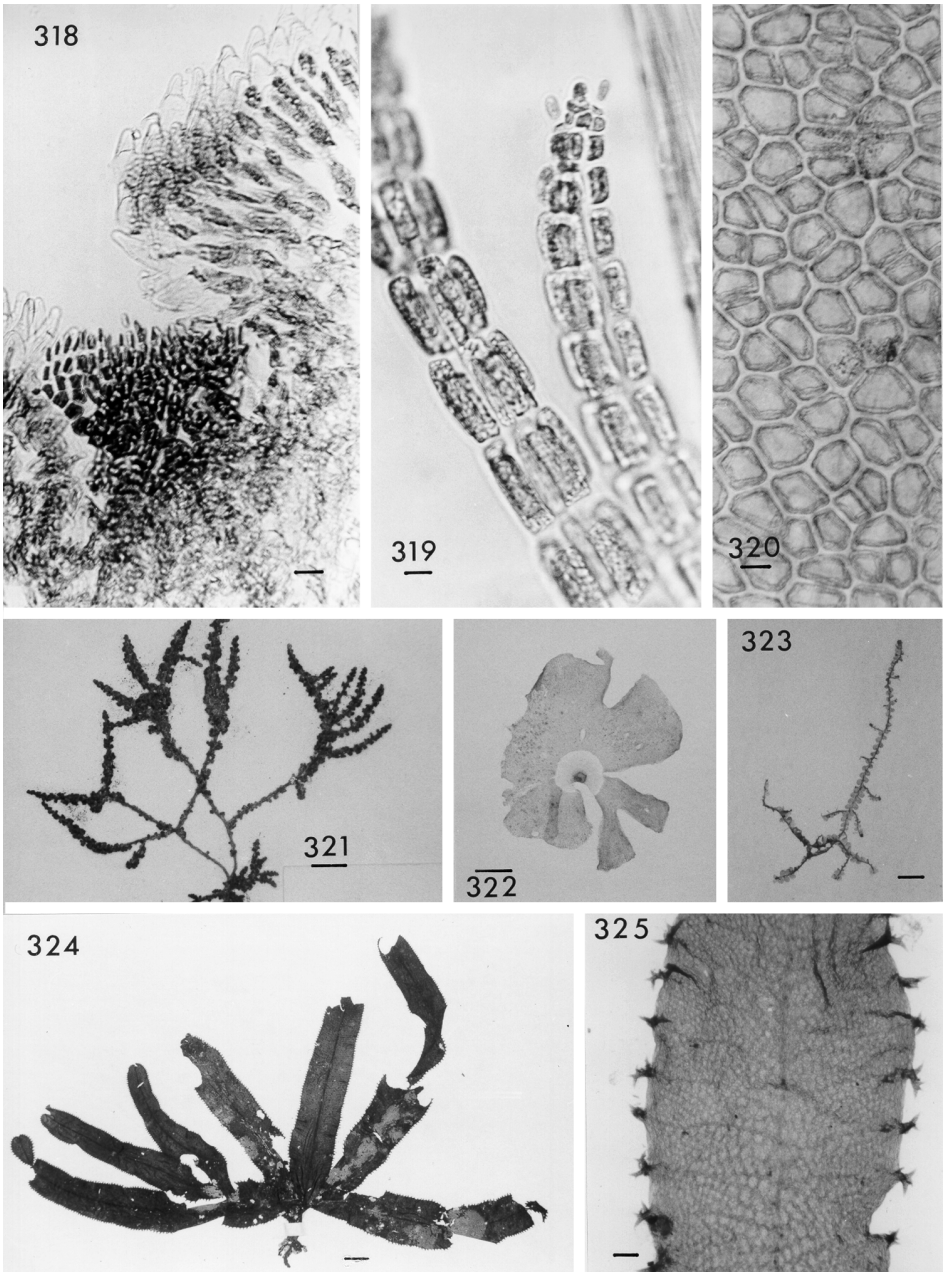


Fig. 318. *Laurencia parvipapillata*. Cross-section of branch apex, showing apical pit with tuft of trichoblasts (SUVA (USP) S15: 5). Scale bar = 10 µm. **Fig. 319.** *Rhodolachne radicosa*. Habit, showing branch apex (SUVA (USP) S14: 1). Scale bar = 10 µm. **Fig. 320.** *Myriogramme* sp. Surface cells of blade (SUVA (USP) S9: 16). Scale bar = 25 µm. **Fig. 321.** *Laurencia glandulifera*. Habit (SUVA (USP) 307). Scale bar = 5 mm. **Fig. 322.** *Neomartensia flabelliformis*. Habit (SUVA (USP) 1137). Scale bar = 5 mm. **Fig. 323.** *Leveillea jungermannioides*. Habit (SUVA (USP) 676). Scale bar = 4 mm. **Fig. 324.** *Neurymenia fraxinifolia*. Habit (SUVA (USP) 714). Scale bar = 10 mm. **Fig. 325.** *Neurymenia fraxinifolia*. Detail of young blade, showing proliferous marginal teeth (SUVA (USP) 714). Scale bar = 5 mm.

25–30 µm in diameter with abundant secondary pit connections between adjacent cells. Secondary pit connections sporadically present between outer epidermal cells. Branch apices with subdichotomously branched trichoblast tufts 50–60 µm high in sunken pits 60–100 µm wide. Material sterile.

Habitat and Remarks

On coral rubble, at 10-m depth; encrusted with epiphytic coralline algae. Thia alga was transferred to the subgenus *Chondrophycus* mainly because of the presence of two periaxial cells only as opposed to four in *Laurencia* (Masuda *et al.* 1997). Current molecular investigations may soon shed light on the position of the entities in question (M. Masuda, pers. comm.).

Laurencia succisa Cribb 1958: 163, pl. 1, figs 1–3 (type locality: Ball Bay, near Mackay, Qld, Australia); Price and Scott 1992: 192, fig. 69*A–D*; Abbott 1999*a*: 391, fig. 114*C, D* (Figs 314, 316, 317)

Fiji and Rotuma Records

N'Yeurt 1997: 320.

Representative Material Examined

Belcher Rocks (*Keats*, 27.xi.1994: SUVA (USP) 1163).

Thallus erect, composed of a clump of 7 or 8 rigid, percurrent and compressed axes 15–25 mm high and 3–4 mm in diameter. Axes with broad tips and curved slit-like distal grooves, bearing frequent, short and simple, distichous, mostly terete ultimate branchlets. Structure pseudoparenchymatous, with isodiametric to elongate cortical cells 107–128 µm long, without secondary pit connections. Subsurface cells rounded, 114–127 µm in diameter and arranged as a distinct uniform layer. Medullary cells rounded to ovate, 178–285 µm in diameter; lenticular thickenings absent. Reproduction not seen.

Habitat and Remarks

Growing in clumps, or attached to coral debris at 15–20-m depth. This is a fairly common deeper-water *Laurencia* species and comprehensive collections may show it to be widely distributed in the region.

Genus ***Leveillea*** Decaisne 1839: 375
This genus comprises a single species (see Scagel 1953).

Leveillea jungermannioides (Hering et G.Martens) Harvey 1855: 539 ('*Leveillia*'); Falkenberg 1901: 392, pl. 6, figs 1–13, pl. 14, figs 18–27; Dawson 1954: 461, fig 63*a*; Price and Scott 1992: 196, fig. 71*A, B*; Verheij and Prud'homme van Reine 1993: 176; Wynne 1995: 315, fig. 71; Abbott 1999*a*: 396, fig. 116*A–D* (Fig. 323)

Basionym and Nomenclatural Synonymy

Amansia jungermannioides Hering et G.Martens in G. Martens and Hering 1836: 485, figs 1–4 (type locality: Tor, Sinai Peninsula, Egypt).

Fiji and Rotuma Records

Kasahara 1985: 68, pl. 17, fig. *C*; Garbary *et al.* 1991: 255; N'Yeurt *et al.* 1996*b*: 86.

Representative Material Examined

Makaluva I. (*Kasahara*, 17.x.1985: SUVA (USP) 676).

Thallus reddish-pink, dorsiventral and epiphytic, up to 1.5 × 30 mm, consisting of branched, cylindrical, ecorticate, polysiphonous and prostrate main axes bearing determinate lateral leaf-like monostromatic branches 300–625 µm broad and up to 1 mm long, arranged alternately in 2 regular latero-dorsal ranks. Prostrate axes indeterminate with inrolled tips and regular ventral rhizoidal peg-like holdfasts. Slender midrib present on lateral branches, with deciduous apical trichoblasts. Structure uniaxial, with 7 pericentral cells around axial cells of indeterminate axes and 3 pericentral cells around axial cells of determinate side branchlets. Reproduction not seen, but described in detail in Falkenberg (1901) and Scagel (1953).

Habitat and Remarks

Epiphytic on larger algae, intertidally on the reef flat. The reddish colour and delicate habit with alternate leaf-like branches of this elegant species are characteristic in the field.

Tribe **Lophothalieae** Schmitz et Falkenberg 1897: 445
Genus ***Spirocladia*** Børgesen 1933: 1

Spirocladia barodensis Børgesen 1933: 3–16, figs 1–10 (type locality: Port Okha, Gujarat, India); Millar 1990: 453, figs 70*A–F*; Abbott 1999*a*: 438, fig. 131*A, B* (Figs 326–329)

Fiji and Rotuma Records

N'Yeurt 1997: 323.

Representative Material Examined

Suva Barrier Reef (*Keats*, 8.x.1994: SUVA (USP) S13: 10).

Thallus 10–12 cm high, arising from a prostrate axis attached to the substratum via slightly digitate hapteroid discs 465–500 µm in diameter. Erect branches 215–224 µm in middle section, tapering to 30–85 µm near the apex; plumose and loosely tufted. Branching sparse and lateral, with frequent fastigiately branched, monosiphonous, determinate photosynthetic trichoblasts 16–20 µm in diameter. Trichoblasts eventually deciduous; branching exogenous in origin. Structure uniaxial, monopodial and radially organised. Axes polysiphonous, axial cell 110–130 × 32–40 µm, with 4 pericentral cells 110–130 × 40–48 µm, with rhizoidal cortical cells 44–70 × 12–20 µm, issued from pericentral cells on main axis. Branching exogenous from axial cell filament (Fig. 329). Spermatangial branches elongated and cylindrical, 643–857 × 129–142 µm, with sterile unbranched monosiphonous filaments along their length; differentiated singly or in pairs from trichoblast branches near the apex of erect branches (Fig. 328). Cystocarps and tetrasporangia not seen, but reported from Australian specimens by Millar (1990, p. 454).

Habitat and Remarks

Epiphytic on the corticated stipe of the green alga *Rhipilia penicilloides*, at a depth of 10 m in the spur and groove zone of the Suva Barrier Reef.

This species is superficially similar to members of the genus *Lophocladia* ((J.Agardh) Schmitz 1893, p. 222), but differs from the latter in the presence of monosiphonous

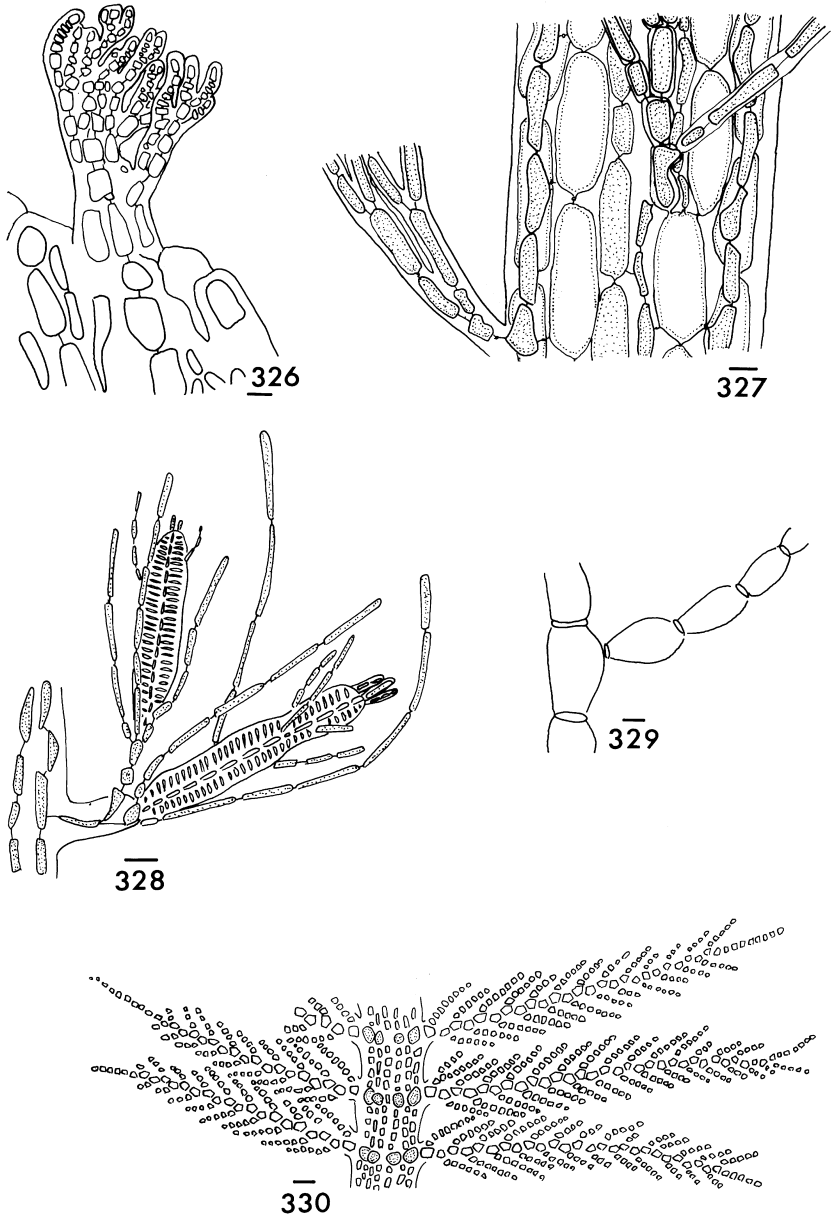


Fig. 326. *Spirocladia barodensis*. Apical trichoblast branch (SUVA (USP) S13: 10). Scale bar = 20 µm. **Fig. 327.** *Spirocladia barodensis*. Surface of thallus, showing corticating filaments and exogenous trichoblasts (SUVA (USP) S13: 10). Scale bar = 20 µm. **Fig. 328.** *Spirocladia barodensis*. Spermatangial branches with sterile monosiphonous filaments (SUVA (USP) S13: 10). Scale bar = 100 µm. **Fig. 329.** *Spirocladia barodensis*. Optical section showing lateral branch issued exogenously from axial filament (SUVA (USP) S13: 10). Scale bar = 20 µm. **Fig. 330.** *Dasyphila plumarioides*. Habit, showing multiple periaxial cells derived from the axial cell filament and sparse cortication. Drawn from a specimen from the Great Astrolabe Reef, Kadavu, Fiji (SUVA (USP) 660). Scale bar = 20 µm.

filaments on the spermatangial stichidia. Millar (2000) discusses generic characters in the Lophothalieae.

Genus ***Rhodolachne*** Wynne 1970: 1780
Rhodolachne radicosa Itono 1985*b*: 53, figs 1–18 (type locality: Estuary of Rewa River, Viti Levu, Fiji) (Fig. 319)

Fiji and Rotuma Records

N'Yeurt *et al.* 1996*b*: 87.

Representative Material Examined

Fish Patch (*Keats*, 21.xi.1994: SUVA (USP) S14: 1).

A detailed and profusely illustrated description of this species was given by Itono (1985*b*, pp. 53–64) and will not be repeated here.

Habitat and Remarks

Epiphytic on *Struvea elegans*, at 42-m depth.

Genus ***Neurymenia*** J.Agardh 1863: 1135
Neurymenia fraxinifolia (Mertens ex Turner) J.Agardh 1863 (1851–1863): 1135; Falkenberg 1901: 44 (Figs 324, 325, 331–333)

Basionym

Fucus fraxinifolus Mertens ex Turner 1811: 140, pl. 193 (type locality: 'East Indies').

Fiji and Rotuma Records

South and Kasahara 1992: 66, in error (as *N.* sp. (1) aff. *N. fraxinifolia* (Mertens ex Turner) J.Agardh, this record being actually *Phacelocarpus neurymenioides*); N'Yeurt *et al.* 1996*b*: 87.

Representative Material Examined

Suva Harbour (*Carlson*, 1972: SUVA (USP) 699; *Keats*, 18.v.1994: SUVA (USP) 714).

Thallus up to 18 cm high, brownish-black, crisp and not adhering to paper when dry. Blades 15–25 mm broad, with ruffled margins and large proliferous marginal teeth. Branching irregular, exclusively from the midrib. Lateral veins almost perpendicular in orientation to the midrib; apex of blade deeply incised with a narrow involucre. Stipe of thallus up to 35 × 2 mm, giving rise to 3–5 branches arising from the midrib. Blade up to 480 µm thick at the midrib, with a central cell up to 100 µm in diameter; in other regions blade 100–110 µm thick, consisting of a central region of subrectangular to ovoid medullary cells of generally equal size 100–145 × 55–75 µm and surrounded by a layer of subrectangular cortical cells 15–20 µm in diameter.

Habitat and Remarks

Found at 15–40-m depth, on the outer reef slope, interspersed with more abundant and superficially similar–looking *Phacelocarpus neurymenioides* plants. The *Neurymenia* thalli can be readily distinguished in the field by their dark brown colour and thin, wide crispy blades.

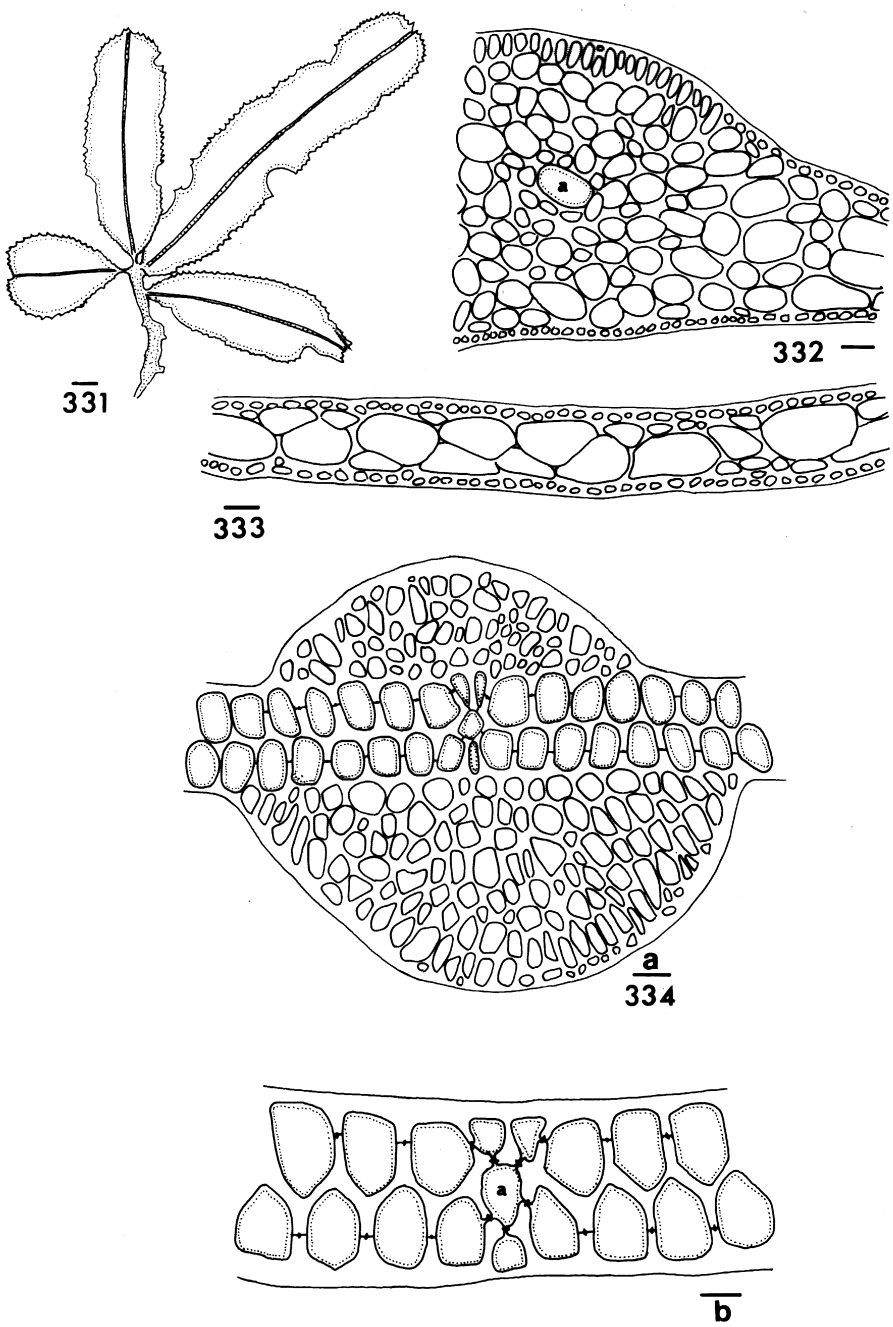


Fig. 331. *Neurymenia fraxinifolia*. Habit showing prominent midrib (SUVA (USP) 714). Scale bar = 5 mm. **Fig. 332.** *Neurymenia fraxinifolia*. Cross-section of thallus at midrib, showing central cell (a) (SUVA (USP) 714). Scale bar = 50 µm. **Fig. 333.** *Neurymenia fraxinifolia*. Cross-section of blade (SUVA (USP) 714). Scale bar = 50 µm. **Fig. 334.** (*a*) *Amansia rhodantha*. Cross-section of thallus at midrib (SUVA (USP) 5438L). Scale bar = 50 µm. (*b*) Detail of axial cell (a) surrounded by five pericentral cells (SUVA (USP) 5438L). Scale bar = 20 µm.

Discussion

Comparison of the Suva Flora with the Greater Fijian Flora

The Fijian flora (excluding Cyanophyceae and non-geniculate Corallinales) currently consists of 341 species (104 Chlorophyceae, 43 Phaeophyceae, 194 Rhodophyceae) (N'Yeurt *et al.* 1996; this study; Rotuma Island records are excluded from this survey as that locality was found to be biogeographically distinct from the rest of the Fiji group (N'Yeurt 1996; N'Yeurt and South 1997)). The distribution ratio of the three main classes of marine algae of the Suva area and the overall Fijian flora are approximately similar, while 65% of the total Fijian flora is represented in the Suva area (N'Yeurt 1997). This is not surprising, as most collections from Fiji have been done in the Suva–Viti Levu region, with other localities such as the Lau Group and Vanua Levu remaining essentially uninvestigated (N'Yeurt *et al.* 1996*b*). The high percentage of new records and species from this study is mainly due to the fact that deep subtidal habitats were essentially under-investigated in most of the past collections from Fiji. Further investigation of the deep-water Fijian flora is expected to change the composition of the known flora, especially from new localities. For instance, the marine algae of the southernmost Fijian land area, Conway Reef (400 miles south of Viti Levu), is totally unknown phycologically and could yield many new records to the flora judging from its proximity to biodiverse localities such as New Caledonia. It is estimated that only about 70% of the total Fijian flora is currently known.

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